RESPONSE OF MULBERRY SEEDS TO GIBBERELLIC ACID TREATMENT

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PREVIOUS reports on the effect of Gibberellic acid on seeds of several plant species indicate, except in a few cases, an acceleration in germination[1,2] and elongation of the seedlings.[1,2] Reversal of the dwarfing effect caused by irradiation in seedlings by subsequent treatment of the seeds with Gibberellic acid has also been reported.[3] In mulberry, the published reports[4-7] are with reference to the effect of Gibberellic acid by the spray methods only. In the present investigations the effect of Gibberellic acid was tested on the seeds of *Morus indica* Linn. Aqueous solutions of the chemical were used in 10 ppm, 25 ppm, 50 ppm and 100 ppm concentrations. The B.D.H. sample of Gibberellic acid was used. The seeds were taken in batches of 200 for a constant weight. Two controls were maintained, one sown after soaking in water for 24 hrs. and the other in the dry state. The batches of the seeds to be treated were soaked in the solutions of the chemical of different concentrations for 24 hours with pre-soaking in water. The imbibition of the water as well as the chemical solution subsequently was recorded. The seeds were sown in wooden flats with sand, in-doors, where the average temperature and humidity were 28° C. and 67·37% respectively. The seed samples used were collected during the month of February 1963 and had been stored for a period of three months at the time of the treatment. The germination percentage was recorded at 24-hr. intervals for all the batches. At the time of transplanting after a growth period of 12 days, the length of the seedlings was scored (cf. Table I).

TABLE I

Percentage of germination and average length of seedlings

No.	Treatment	No. of seeds sown	% of germination	Average length of seedlings (Average of 50)
1	GA 10 ppm	200	62	1·83″
2	,, 25 ,,	200	77	1·96″
3	,, 50 ,,	200	94	2·13″
4	,, 100 ,,	200	86	1·55″
*5	Control I	200	34	1·51″
†6	,, II	200	26	1·53″

* Seeds soaked for 24 hrs. in water and sown,
† Seeds sown in the dry state.

From the observations recorded, the significant points indicated are, that (*i*) the treatment with Gibberellic acid at all concentrations has revealed an acceleration of germination (Fig. 1), (*ii*) a higher percentage of germination (Fig. 2) and (*iii*) increase in the length of

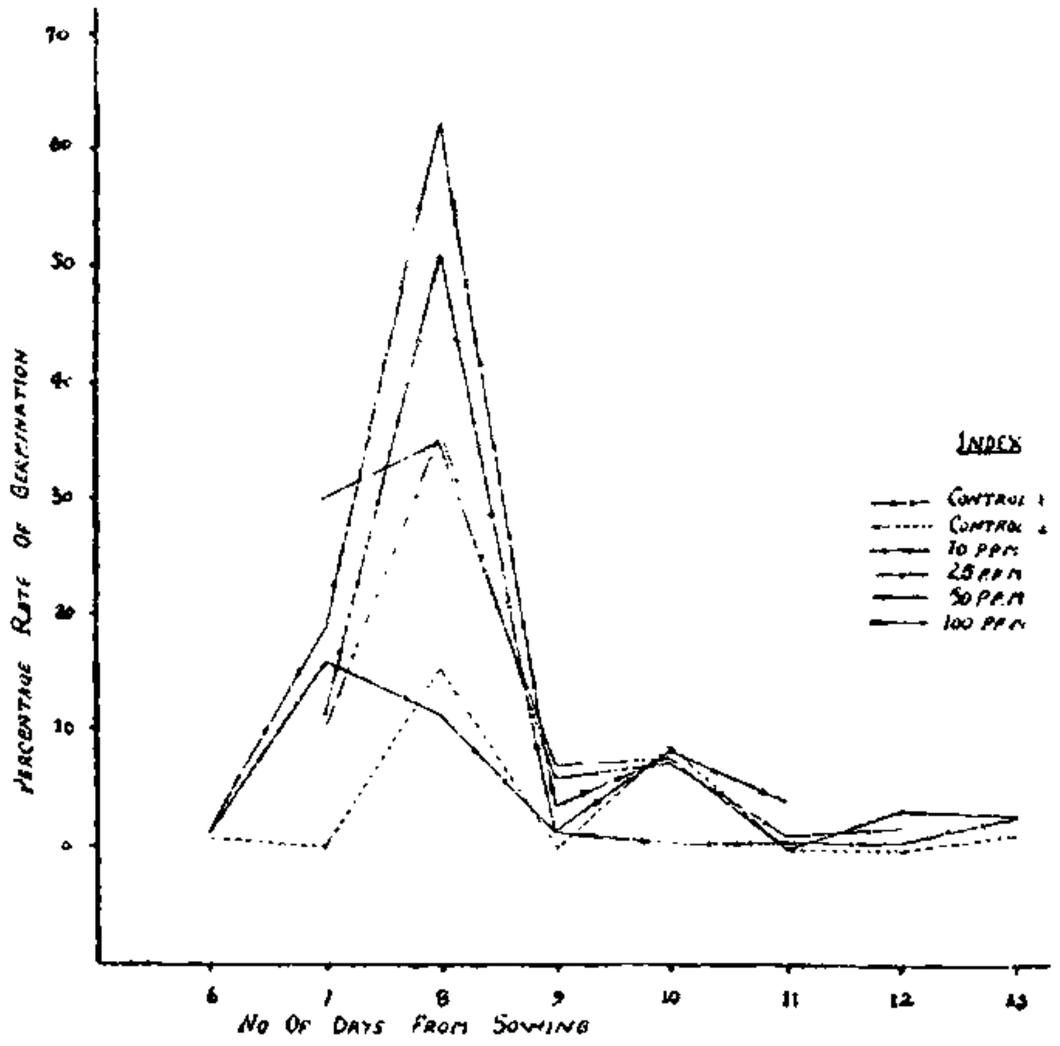

FIG. 1

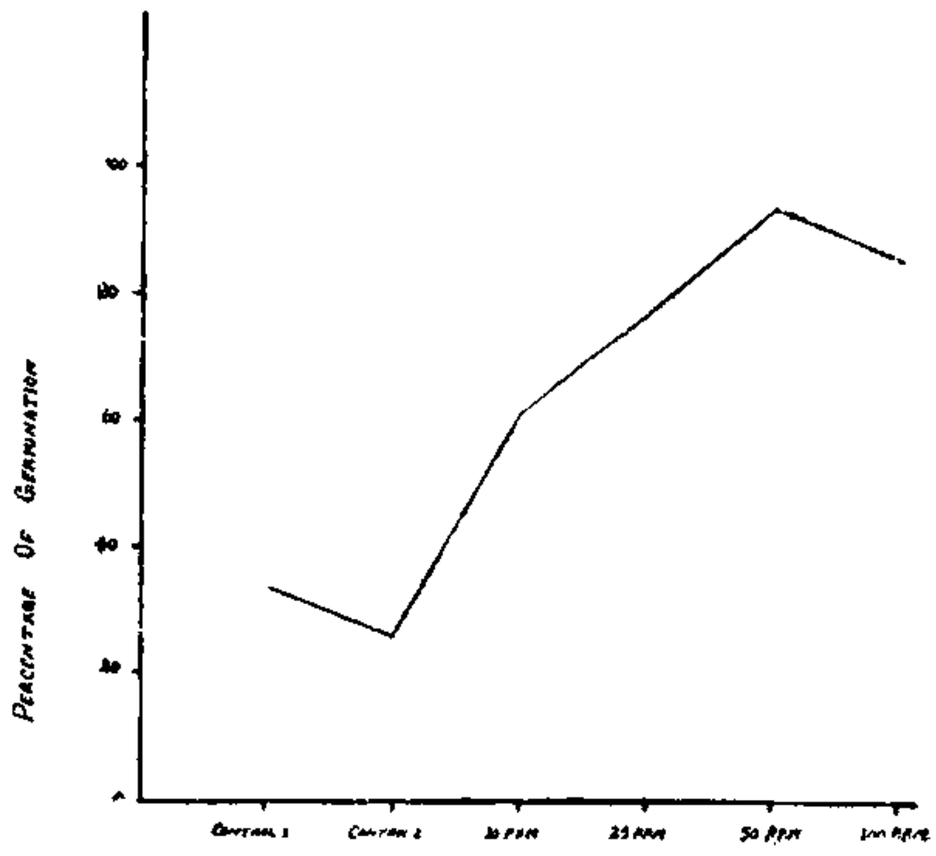

FIG. 2

the seedlings as compared to the controls (*cf.* Table I). The 50 ppm concentration was the most effective giving maximum values for all the factors cited above. A point of practi-

cal interest in this study has been that, treatment with Gibberellic acid has given maximum germination values even for seeds stored under ordinary conditions, as the results of the previous investigations on mulberry seed storage in this laboratory[8] had indicated considerable loss in viability with increasing periods of storage. In the previous investigations[8] the maximum percentage of germination was recorded for fresh seeds sown with pulp and very low values were obtained for stored seeds. In the present study, even the seeds stored for a period of three months have given the maximum germination value of 94% with the 50 ppm Gibberellic acid treatment. This is a pointer to the advantage of the Gibberellic acid treatment in getting better germination values with stored seeds. Another special point of note is that the response to Gibberellic acid treatment is more significant in seed treatment as compared to the shoot-bud treatment by spray, the results of which are elaborated in another paper under communication.

1. *Gibberellic Acid*, Plant Protection Limited, Fernhurst Research Station, England.
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3. Gaur, B. K. and Notani, N. K., *Internat. Jour. Radiation Biol.*, 1960, **2** (3), 257.
*4. Takizawa, Y. and Kano, S., *Abstr. 2nd Meeting, Japan*, Gib. Res. Ass., 1958, p. 78.
*5. — and —, *Abstr. 3rd Meeting, Japan*, Gib. Res. Ass., 1960, **4**.
*6. — and —, *Abstr. 4th Meeting, Japan*, Gib. Res. Ass., 1961, **11**.
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* Not seen in original.

ON THE REGULARITY OF THE TETRAHEDRA IN QUARTZ

ON the basis of extensive structural studies, it has been practically taken for granted that in quartz as well as in the other silica phases the SiO_4 tetrahedra are strictly regular; that any of the observed small deviations from regularity was simply the result of experimental errors in the diffraction data. However, two recent refinements on α-quartz, the first by Young and Post (YP) in 1962, and the second by Smith and Alexander (SA) in 1963,—have yielded bond data which seem to suggest a rethinking in this regard. While some of the bond data presented by them are consistent with the regular configuration, the deviations from regularity shown by others are large enough to be statistically significant, as for example :

S and A : Si—O 1·617 Å ; 1·597 Å.
∠ Si—O—Si 144·0°
Y and P : Si—O 1·611 Å ; 1·603 Å.
∠ Si—O—Si 143·9°

The existence of regular tetrahedra in quartz introduces relationships between the size of the tetrahedra and the unit cell dimensions ; and from the temperature dependence of the unit cell dimensions some definite conclusions can be drawn concerning the regularity of the tetrahedra at a number of temperatures.

Gordon S. Smith (*Acta Cryst.*, 1963, 16, 542) from analysis based on symmetry considerations has derived the conditions under which the SiO_4 tetrahedra in quartz can be strictly regular. According to him for such a configuration the Si—O bond distance in α-quartz must be $[\sqrt{(3)}\,a - c]/2$, and c/a must be $< 3/2\,[\sqrt{(3)} - 1]$; in β-quartz the axial ratio must be $(3/2)\,[\sqrt{(3)} - 1]$.

Comparison of his deductions with published data on lattice constants, shows that in the vicinity of room temperature regular SiO_4 tetrahedra are not possible in α-quartz, or in β-quartz. Hence the deviations from regularity reported by SA and YP in α-quartz must be regarded as real. It is suggested that α-quartz at 25° C. be considered to have two different types of Si—O bond lengths, namely, 1·600 ± 0·003 Å, and 1·614 ± 0·003 Å.