Table 2. Effect of Gibberellin Applications to Soil Alone and to Plant and Soil. Measurements were made 19 days after planting, the plants having been sprayed only once, 5 days after planting

	Treatment		
	None	Soil only	Soil + plant
No. of plants	16	14	17
Terminal bud height (cm.)	24·2	36·6	75·0
Average dry weight per plant (gm.)	0·82	0·95	0·50
Percentage of plants showing nodulization	62·5	76·5	14·2

In a subsequent experiment, it was shown that gibberellin treatment of the soil was ineffective in inhibiting nodulization, though some growth effects were readily apparent. Gibberellin sprays applied to the plant and soil were more effective, both in increasing elongation and in decreasing nodulization (Table 2).

Although the mechanism of the inhibition of nodulization is not clear from these experiments, the results indicate the need for caution in the application of gibberellins to leguminous plants. They also suggest the possibility that nodulization may result from a local accumulation of gibberellins.

These experiments were performed as a project supplementing classroom exercises in plant physiology at a National Science Foundation-sponsored Summer Institute for Teachers held in the summer of 1957 at Iowa State Teachers' College at Cedar Falls, Iowa.

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Mitotic Delay in Irradiated Roots of *Vicia faba*: the Effect of Oxygen

It is well known that the presence of oxygen during the irradiation of biological materials by X- or gamma-rays usually increases the amount of radiation damage. At the cellular level a considerable amount of quantitative data exists on the effect of oxygen, given during irradiation, on the yield of chromosome aberrations[1], but little information is available concerning the influence of oxygen on the amount of mitotic inhibition. Early work on the fall in mitotic index values of broad bean root tips[2] and the more recent studies on mitotic rates of *Chortophaga* neuroblasts[3] and *Tradescantia* microspores[4] have all indicated that the degree of mitotic inhibition is dependent on the amount of oxygen present during irradiation.

We have investigated the oxygen effect on mitotic delay in broad bean root tips with the view of making a comparison with parallel results which we are obtaining for chromosome breakage and root elongation in this material. In our experiments gamma-rays from a cobalt-60 source were used, and the primary roots of seedlings were irradiated while maintained at

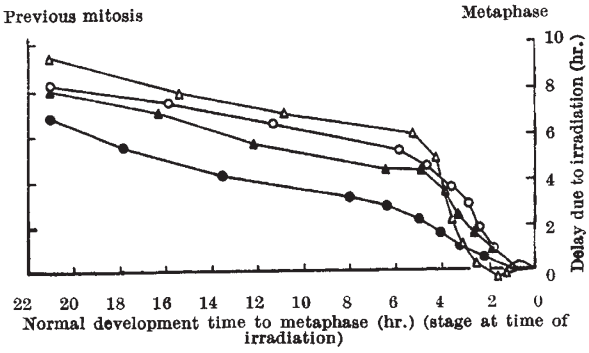

Fig. 1. Delay in reaching metaphase of cells irradiated at various stages of interphase. Normal mitotic cycle time, 21 hr. △, 192 r. in aerated water; ○, 109 r. in aerated water; ▲, 192 r. in nitrogen water; ●, 109 r. in nitrogen water

19° C. in aerated or oxygen-free water (nitrogen water, obtained by bubbling nitrogen). For irradiation the seedlings were transferred from their normal aerated water into the aerated or nitrogen water of the irradiation chamber for 5 min. before irradiation. Doses of 109 r. and 192 r. were used and both doses were given in 4·9 min. It was shown that a 10-min. immersion of control seedlings in nitrogen water did not affect mitotic rate.

Mitotic delay was measured by our colchicine method[5] which involved comparing the rate of accumulation of cells at metaphase in control material with the rates in the irradiated materials, at closely spaced time-intervals after irradiation. From these results we obtain the time required for cells to reach metaphase after being irradiated at any given point in interphase. The excess time over cells of control material, that is, the mitotic delay, is illustrated in Fig. 1.

The results show a marked oxygen effect for mitotic delay, and this effect is apparent for cells irradiated at any stage of interphase, the shape of the air and nitrogen curves being very similar. It is clear from these results that a dose of 192 r. in nitrogen is less effective in delaying the progress of cells through the mitotic cycle than a dose of 109 r. in air. Comparisons of the delays induced by both doses of radiation, in air and nitrogen, for cells which were more than 6 hr. from metaphase at the time of irradiation, gives an air/nitrogen ratio of about 2. This compares with the air/nitrogen factor of 2·4 for inhibition of root growth[6] and the factor of 2·2–2·5 which we have found for the production of micronuclei.

Further details of these experiments will be published elsewhere.

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