values observed are caused chiefly by constituents of nuclear substances such as purine-pyrimidine compounds.[1] These are not necessarily nucleic acids, but may be their cleavage products, as pointed out previously (Spiegel-Adolf *et al.*, *5*).

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[1] In this connection, it also seems noteworthy that in some conditions associated with a statistically significant increase of the selective absorption of the CSF at 2,650 A (e.g., following repeated electro-shock treatment), substances able to split *added* nucleic acids are increased in the CSF (*5*).

Some Effects of Nonherbicidal Concentrations of 2,4-D on the Development of the Bean Plant

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Reports on the influence of nonherbicidal concentrations of 2,4-D on bean plants have been published by Wittwer and Murneek (*8*), Weaver (*7*), Burton (*1*), and Stromme and Hamner (*6*). The results of the preliminary experiment reported here confirm and extend previous observations on the morphological effects of 2,4-D on beans and on the delaying and inhibiting effect of 2,4-D on reproductive development found by Weaver (*7*) and Stromme and Hamner (*6*). No hastening of maturity or increase in yield such as was reported by Wittwer and Murneek (*8*) was found in this study.

Plants of *Phaseolus vulgaris* L. (var. bountiful) were sprayed on both surfaces of all leaves with 1, 5, and 10 ppm of the sodium salt of 2,4-D on February 27, 1948, when they were 21 days old and had two fully expanded compound leaves. Although there were only four replications per treatment because of space limitation, statistical analysis of the data secured indicated the differences reported here to be statistically significant except where otherwise noted. Daily observations of the development of each plant were made, and all abscised leaves were retained for inclusion in the final dry weight determinations. The plants were allowed to complete their life

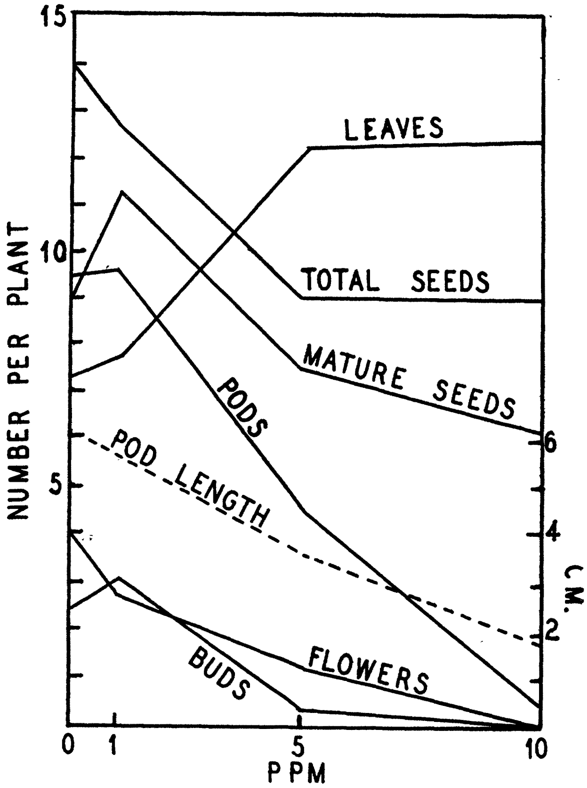

Fig. 1. Mean number of parts per plant and mean length of pods, illustrating the delaying and inhibiting effect of 2,4-D on reproductive development. The data on flowers and flower buds were secured March 10, on pods March 19, and on seeds and leaves April 30.

cycles. No pods were removed until they were dry and mature, but they were picked before dehiscence to avoid the loss of seeds. By April 30 all leaves had abscised and all seeds matured. Dry weights were then determined.

None of the treatments produced visible effects on the opposite, simple leaves, but the compound leaves of plants sprayed with 5 and 10 ppm exhibited characteristic inward rolling and epinasty. In three plants receiving 10 ppm the stem assumed a horizontal position, and the youngest fully expanded leaf a vertical position. The stem resumed vertical growth at the next node, but the horizontal portion remained in that position. Otherwise, recovery from epinasty had occurred by March 3. The 5- and 10-ppm concentrations caused a temporary inhibition of growth in height, but there were no significant differences in final height. By March 13 all plants sprayed with 5 and 10 ppm and, to a slight degree, some of those sprayed with 1 ppm had developed new leaves with crinkled, lanceolate, and mottled leaflets. The tissue adjacent to the veins became chlorotic, but the leaflet margins and vein islets remained green. By March 19 the leaves of the control plants and some of those on plants which had received 1 ppm were turning yellow, apparently due to the approach of maturity, but all leaves on the plants which received 5 or 10 ppm were still dark green. Small, white, conical outgrowths developed on the

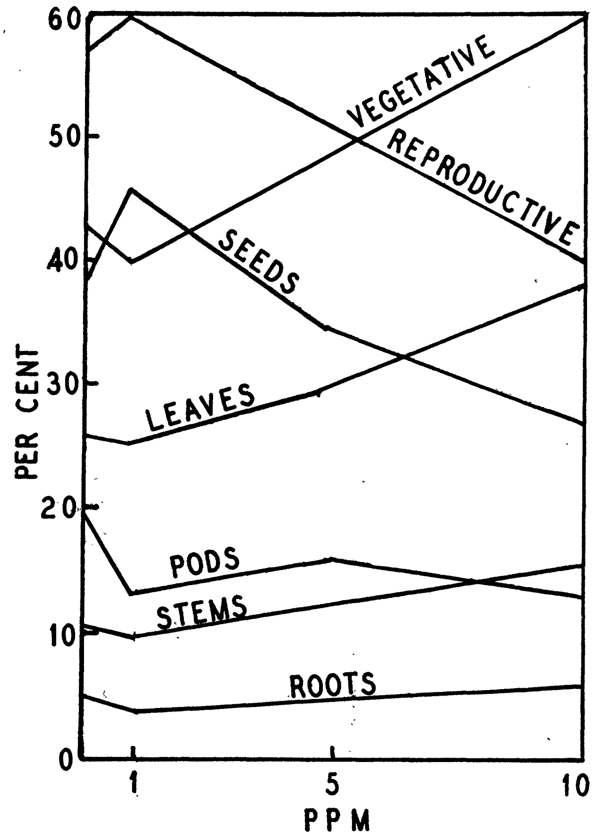

FIG. 2. Effect of 2,4-D on the dry weight of the various organs of bean plants and of the total vegetative and reproductive organs, expressed as percentage of the total dry weight.

under surfaces of some of the most deformed leaves. These were similar to those reported by Felber (*3*) but had developed during March and April, while Felber found such proliferations on the lower epidermis regularly only from June to October.

The 2,4-D appeared to promote, rather than to delay or inhibit, leaf abscission. Leaf abscission began on the controls and plants in all treatments on March 30 but was completed a weak earlier in the plants sprayed with 5 or 10 ppm than on the controls or plants sprayed with 1 ppm. The abscission of leaves from all plants reached a peak between April 11 and 14, and the rate during this peak period was higher for all treated plants than for the controls.

All controls and plants which received 1 ppm, and two plants which received 5 ppm began blooming on March 8, but none of the plants sprayed with 10 ppm bloomed until a week later. The number of macroscopic flower buds and flowers on March 10 is given in Fig. 1, and the data on pods in this figure provide additional evidence of the delaying effects of the 5 and 10 ppm concentrations on reproductive development. That this repression of reproductive development was not due to a general repression of growth is indicated by the increased vegetative development of the treated plants (Figs. 1 and 2). Some of the flowers on the plants sprayed with 10 ppm were deformed, having greatly reduced petals, elongated and exserted styles, and ruptured ovaries. The pods of the plants sprayed with 5 and 10 ppm were unusually dark green, and even those on plants sprayed with 1 ppm were darker green than the controls.

None of the treatments had a significant effect on total dry weight of the plants, but there were significant differences in the dry weights of the various organs (Fig. 2). The 5- and 10-ppm concentrations definitely produced a decrease in the dry weight of the reproductive organs and a concurrent increase in the dry weight of the vegetative organs. The 1-ppm concentration, however, produced a significant effect which was the reverse of this, due principally to the unusually high seed weight in this treatment. This was not due to a greater weight per seed, nor to a larger total number of seeds, but to a larger number of fully mature seeds (Fig. 1). In general, the weight per seed decreased with an increase in concentration. (The mean weight of the mature seeds of the controls was 0.328 gm, and mean weights of the seeds of the plants treated with 1, 5, and 10 ppm were 0.286, 0.337, and 0.259 gm, $\pm$ 0.020). There is no evident explanation for the high weight per seed in the 5-ppm treatment. The increase in the total dry weight of the leaves with concentration of 2,4-D was due to the increase in the number of leaves, rather than to an increase in weight per leaflet, which actually decreased with higher concentrations. It seems possible that the delaying and inhibiting effects of 2,4-D on reproductive development reported here and by other investigators are the same type of phenomenon as the inhibition or delay action of other growth substances, reported by Dostal and Hosek (*2*), Obsil (*5*), Galston (*4*), and others.

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The Effect of Castration and of Testosterone upon the Respiration of Rat Brain

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In an earlier paper (*3*) it was reported that various steroids are capable of inhibiting the oxygen uptake of rat brain homogenates. It was found that testosterone inhibits the oxidation of glucose at some point preceding participation of the cytochromes in "the main line of