The Effect of Gibberellins on Vegetative Growth and Flowering Habit of Geranium*

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Gibberellins have modified a number of growth responses in plants, such as reversal of physiological (Barton, 1956) and genetic (Phinney, 1956) dwarfism, alteration of the low temperature and long day requirement in biennials (Lang, 1956, Wittwer, 1957) and acceleration of the growth cycle (Wittwer, 1957).

This investigation demonstrated the first known instance of an increase in flower size induced by a plant growth regulating substance. Initial greenhouse experiments established the dosage-response relation on vegetative growth in *Pelargonium hortorum var.* Olympic Red (Table I). Foliage application of gibberellic acid produced internodal elongation, petiole elongation and an increase in leaf size. Slight chlorosis and loss of red zonal coloration on the foliage was noted approximately ten days after treatment. Six to eight weeks after treatment, leaf color was restored to its original condition. The 100 ppm concentration caused excessive legginess and abnormal leaf size and shape. At 10 ppm, the plants were initially leggy; but within six to eight weeks after treatment, they were of good conformation. Wittwer (1957) has reported that in certain crops the ratio of root to shoot growth was decreased with gibberellins. The data in Table I indicate the root to shoot weight ratio is not decreased in geraniums treated with gibberellic acid. An experiment with the White Wonder variety of *P. hortorum* likewise indicated that root to shoot weight ratio was not decreased ten weeks after treatment with a 10 ppm foliage spray.

TABLE I—The Effect of One Foliage Application of Gibberellic Acid *on Vegetative Growth of P. hortorum (var. Olympic Red)*

Concentration[a] ppm	Height cm	Root Weight-Shoot Weight[b] Ratio	No. of Breaks per plant
Control	28	0.13	3
1	30	0.18	3
10	39	0.16	3
100	44	0.13	3

[a]Plants grown at 58°F night temperatures.

[b]Measurements made five months after treatment. Four replicates were used per treatment. Root to shoot weight ratio based on fresh weight.

*This article was submitted for publication by the research workers of Merck & Co., Inc. It does not mean that we are endorsing the use of Gibberelic acid. We feel that the material is still too new for commercial use.

The potassium salt of gibberellic acid (10 ppm) applied either to the foliage or flower bud of Olmpic Red and White Wonder varieties *of P. hortorum*, just prior to the appearance of color in the flower bud, induced an increase in the size of the inflorescence (Table II, Fig. 1).

TABLE II—The Effect of One 10 ppm. Foliage Application of Potassium Gibberellate on the Inflorescence in *P. hortorum var. Olympic Red and White Wonder.*

Parts of Inflorescence[a]	Olympic Red Control	Olympic Red Treated	White Wonder Control	White Wonder Treated
Pedicel length (cm)	2.5	4.2	2.5	4.2
Petal width (cm)	1.2	1.8	1.0	1.6
Inflorescence Dia. (cm)	8.3	11.9	6.8	11.1

[a]Plants grown at 58°F night temperatures.
Measurements made 23 days after treatment.

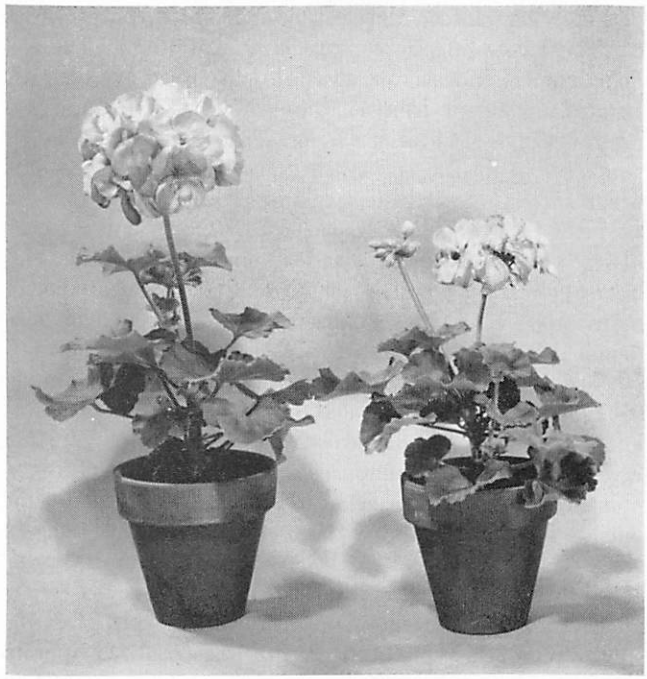

Figure 1. Geranium variety Olympic Red treated with 10 ppm. potassium gibberellate just prior to the appearance of color in the flower bud (left); untreated (right).

The observed increase in size of the inflorescence is apparently due to a number of factors. There is an elongation of the pedicels in the umble; second, the petals are enlarged; and, third, preliminary evidence indicates that

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potassium gibberellate reduces the number of aborted flowers. The observations on flower habit were made in three separate experiments. At least five replicates were used in each experiment.

Although the flower buds begin opening at approximately the same time in the control and treated plants, the individual flowers in the inflorescence expand more rapidly in the untreated plants. The petals of the control plants begin to fade by the time the petals on the treated plants are fully expanded. However, the size of the inflorescence on the treated plants is approximately the same as the control plants when the petals on the control plants begin to fade. Thus, the inflorescence on the plants treated with potassium gibberellate is not only larger but alo persists ten days longer than the controls. In other floricultural crops where the inflorescence is an umbel, corymb or raceme, potassium gibberellate might be expected to enlarge the inflorescence merely by elongation of the pedicel.

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