Colorado Flower Growers Association, Inc.

IN COOPERATION WITH COLORADO STATE UNIVERSITY

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Growth Regulators for Greenhouse Flower Crops

by

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With the development of gibberellic acid and other more recent growth inhibiting chemicals, we are entering into a new, and perhaps amazing, period of research which may lead to the possibility of chemical control of plant growth to meet the needs of our particular markets.

Gibberellic acid, like the soil conditioner Krillium, received too much advanced publicity; it was advertised during the early experimental stages when it is difficult to know if a compound will really have any value to the greenhouse industry. Now, after several years of work by many research workers, there is evidence to suggest that gibberellic acid may be useful in the production of certain greenhouse flower crops. For the majority of greenhouse flower crops, however, gibberellic has no value, and may be detrimental to quality.

What is it, what can it do?

Gibberellic is not a new compound - the principle was discovered by a Japanese plant pathologist in 1926. During the investigation of a rice seedling disease, he observed that a fungus, Gibberella fujikuroi gave off a chemical substance that literally caused rice seedlings to grow themselves to death. Hence, the name "foolish-seedling disease". The actual chemical substance was isolated in 1935 by other Japanese workers, but it wasn't until 1950 that knowledge of G.A. became available to the Western World.

Gibberellic acid is produced in the same manner as anti-biotics, and is effective on plants in extremely small quantities.

1. Stem elongation is the most obvious response - effective when applied to young, actively growing tips of plants. It does not move readily from one part of the plant to another. Repeated applications are usually necessary for pronounced effect.

2. Intensity of green color in leaves is reduced - regular applications of N help to reduce the severity of N deficiency; but they may not eliminate the poor quality that often results from applications of G.A.

3. A change in the nature of plant growth may occur - genetically dwarf plants

may be changed into normally tall plants; leaf shape may be altered; juvenile growth characteristics may be retained in mature plants.

4. Horticultural quality may be reduced - increase in stem length, leaf size may not have a corresponding increase in fresh or dry weights. Tall but weak and spindly growth is characteristic result of applications of gibberellic acid.

Plants where benefits are limited

1. Dwarf plants - dahlias, dwarf asters.
2. Snapdragons - side shoots develop.
3. Poinsettias - tall, weak stems, poor bracts.
4. Roses - stem elongation occurs in "neck" region; leaves remain red in color; outer flower petals may be crippled.
5. Petunias - tall, leggy; some suggestion of earlier flowering.
6. African violets - causes "rabbit ears" effect. On young plants - larger size in a shorter period of time.
7. Chrysanthemums - excessive stretching of stems below flower head; may have limited use to elongate pedicels to improve spray formulation.
8. Cyclamen - repeated applications caused development of abnormal stems, leaf petioles, and weak pedicels. May have possibilities of elongating pedicels (1 or 2 applications) in the event they do not develop properly so that flowers are displayed above leaves.

Plants where effects may be useful

1. Geraniums - an increase in flower cluster size occurred with one 10 ppm spray applied when buds were just beginning to show color; white varieties also kept longer. May be possible to produce saleable plants in a shorter time. One inch geranium cuttings taken March 1 - rooted March 25 - in flower May 17. Item designed for cash and carry sales; not to compete with normal, high quality geranium.

2. Foliage plants - tried only on Ivy - very definitely increased growth and size of plants.

3. Hydrangeas and Azaleas - can replace some or all of the cold temperature necessary for stem elongation in Hydrangeas, and bud development in Azaleas. Start to spray azaleas with a 1000 ppm solution at the time plants are normally placed in storage; 6-8 applications. Production time same as when refrigeration is used. Excellent for early forcing where refrigeration is not available or natural cold temperatures do not occur sufficiently early.

Stem growth-inhibiting chemicals

These restrict stem elongation without affecting size and vigor of leaves, and flowers. To date, all materials delay flowering in direct proportion to the extent of stem growth inhibition.

Compounds Available -

1. Quaternary-Ammonium Carbamates; also referred to as Amo-1618. Carvadan is an isomer of Amo-1618 and is effective in restricting stem elongation of poinsettias. Chrysanthemums and several other plants respond nicely to Amo-1618. Delay in flowering major objection to use of this material. Used both as spray, root dip or soil drench. Can be toxic to humans.

Yellow Lace chrysanthemum grown in soils containing no, 2½, 5 and 10 grams of Phosphon D per bushel of soil. Twenty 6-inch pots per bushel of soil.

2. Phosphonium or Phosfon-D effective on petunias, lilies, chrysanthemums, asters, but not on poinsettias. Used as a soil mix, or soil drench. Highly toxic when applied to foliage.

To produce chrysanthemum cut flower varieties as potted plants 3 1/2 grams of Phosfon-D per bushel (20 six inch pots) should be incorporated into soil mixture before potting. Also has been applied as a surface drench within two to three weeks after potting.

For petunias - between 10 and 50 grams of Phosfon-D per bushel of soil. Branching, leaf size, flower size normal; some delay in flowering observed.

Similar effects can be obtained with day-length or temperature control. Photo-periods below 10 hours promote branching of petunias and restrict stem elongation. Temperatures of 50°F result in a similar response. Photoperiods longer than 12 hours promote flower initiation and stem elongation. Temperatures of 60 or 70°F with long days promote stem elongation and restrict branching.

Easter lilies - work now in progress - approximately 350 mg. per plant of Phosfon-D effective (7 grams per bushel.)

Other compounds recently made available by American Cyanamid are:

3. CCC - 2-chloroethyltrimethyl ammonium chloride, and
   ANAB - Allyltrimethyl ammonium bromide.

Several factors should be kept in mind when using the stem growth inhibiting chemicals -

1. Mix thoroughly with the soil.
2. Fertilize and water carefully since these materials do restrict root growth to a slight degree.
3. Adjust schedules to take into account the delay in flowering - with mums this delay has been as much as 7-21 days.
4. These chemicals are no substitute for good cultural practices.