

by: Walter L. Harper
Associate Professor of Floriculture

For many growers and home gardeners the Annual Trial Gardens Field Day at the Comstock Ferre and Co. in Wethersfield has become a yearly event. The 5th annual trial day was held on August 10, 1985. With warm sunny dry weather the plants were in excellent condition. A peek into the future was provided by the All America trials on display.

There are over fifty All America flower and vegetable trial gardens in the United States and Canada. Each year private commercial and government plant breeders submit entries to the All America Selection Committee. The plants are grown and compared with the nearest equivalent cultivar available on the market. To be selected, the test cultivar must score well in all of these trial gardens.

Connecticut has two All America Trial Gardens. Vegetable trials are conducted under the direction of Dr. Richard Ashley of The Department of Plant Science at The University of Connecticut. Both vegetables and flowers are tested at the Comstock Ferre site in Wethersfield. Vegetables are judged by Mr. Richard Willard and flowers by Mrs. Richard Willard. This is the only location in New England where both vegetables and flowers are tested at the same site.

Concentrating on flowers only, I would like to share some observations I made during the Field Day. Remember, the cultivars being tested do not have names yet, only numbers. Also be aware that although a cultivar looked good in Connecticut that day, it does not mean it will become an All America Selection. It must look good throughout the summer at all of the test sites. Finally, once a cultivar is selected, it may take several years before enough seed becomes available to meet consumer demand. Thus the following are some of the outstanding cultivars that were observed that day.

A new ornamental basil may be on the horizon. The deep wine-red plant is similar to 'Dark Opal', an All America Selection developed by Mr. John Scarchuk and the late Mr. Joseph M. Lent at The University of Connecticut in 1963. However the new cultivar is more compact with fringed leaves. It looked good.

In 1966, a new burnt-orange cosmos called 'Sunset' was introduced as an All America Selection. Another from that

group called 'Diablo' was picked in 1974. This year a new reddish-orange cosmos was observed to be shorter and more compact than the previous introductions. Watch for this one.

Two dianthus looked good. Both plants were compact and only nine inches high. Their numerous flowers were about one inch in diameter. One was a deep crimson; the other was a deep rose pink with white frosting on the outer edges of the petals.

At least one geranium from seed seemed to have merit. The plants were low, compact and nine to twelve inches tall. The flowers were deep scarlet red singles. The leaves displayed an excellent zoning pattern.

A novel garden plant grown for its attractive ornamental fruit rather than its flowers is in the ornamental pepper. The test cultivar grown this year was low, compact and only nine inches tall. The upright cone-shaped fruit were clustered in the center of the plant. The fruit first developed a yellow color which turned to a brilliant red.

Although many petunias were tried, a purple double caught my eye. Numerous double velvety purple flowers were produced on compact plants. We should see more of this one.

Probably the most outstanding yellow marigold in the trials was being compared to 'Janie' and 'Bonanza Yellow'. Having 2 to 3 inch yellow flowers on 12 inch high plants, it looked better than these existing cultivars.

Over the years few annual sunflowers have been developed. An unusual double-flowered cultivar was being tested. The plants were only 12 to 15 inches tall producing 3 to 4 inch golden flowers. While this plant had been in flower most of the summer, the taller comparison cultivar 'Teddy Bear' was just beginning to flower. The new one looks good.

Several new verbenas were being tried. One was a pale lavender color with many of the same qualities as the cultivar 'Amethyst'. Two other cultivars with mixed colors were rather eye catching.

Three zinnia cultivars were worth noting. A fuchsia colored button type was very similar to its comparison cultivar named 'Small World Cherry'. Another excellent zinnia was about 18 inches tall and had 3 to 4 inch clear salmon pink flowers. Unfortunately, there were a few bright orange flowers showing up, which suggested that the color was not yet stable. In time this cultivar could be selected. The third cultivar possessed a good color mix of 3 inch flowers on plants 12 inches tall.

As you can see, it is difficult to write about cultivars with only numbers and no names. It is possible that none of the cultivars seen may ever become All America Selections. It is interesting however to get a sneak preview and make your own tentative selection.

Besides the All America Trials at the Wethersfield site, I saw four display gardens designed to provide ideas for any homeowner's garden. These gardens featured named cultivars currently available. They included a Bench Garden, an Herb Garden, a previous All America Selection Garden and a Rural Mailbox Garden. These attracted much interest at the field day.

If you missed this years field day, mark your calendar for 1986 and plan to attend next year's in August. It is an opportunity that should not be missed. Watch for the day and time in your newspaper or garden column.

Opportunities

Jay S. Koths
Extension Horticulturist

College graduates in agriculture are obtaining better salaries. Seven years ago the average salary was less than \$11,000 per year. A year ago it had risen to \$16,446 (an increase of 53%) according to the National Association of State Universities and Land Grant Colleges. It also reports that the number of graduates fell by one third.

During this past year, opportunities in greenhouse management have been exceptionally good. It hurts us to have to reply to a request for help "sorry, we don't know of anyone looking for such a job".

A decade ago, graduate numbers were high. Now, many opportunities exist but students are sparse. With anticipated growth of the greenhouse industry to supplant imports, the opportunities in our industry are better than ever.

Do you know any young people who are looking for a niche in this world and would make viable candidates for the opportunities in greenhouse production and management in the coming years?

available to indicate if any negative impact to plant growth occurs at 0.25 ppm chlorine or less.

A recent paper by Bridgen (2) indicates that 15 ppm chlorine used at every irrigation, can cause adverse results on zinnia and chrysanthemum. This is far above levels normally found in municipal water supplies.

Soil pH strongly influences the availability and uptake of certain ions. For the most part, water supplies meeting secondary drinking water standards are slightly alkaline due to excessive sodium addition. Negative results are more likely due to additives than to unbuffered acidic water which is normal in parts of Connecticut.

Good water is essential for producing quality greenhouse crops. Have your water tested. A plastic rubbing alcohol bottle makes a good container for sending a sample to the UConn Soil Testing Laboratory (Box U-67, Storrs, CT 06268, \$2.00). If the pH is too high and calcium is very low, excess sodium has been added.

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the most popular approach with public water treatment systems is the use of chemical additives. Sodium hypochlorite is added to kill bacteria, sodium aluminate and aluminum sulfate (alum) are used as a coagulant and sodium hexametaphosphate and sodium hydroxide for pH control (5).

There is little information available about possible negative effects of using such chemically treated water in greenhouse plants. However, it appears there are two issues of major interest—the calcium/sodium balance and the chlorine effect.

Calcium is an important essential element for plant growth as it is needed for cell wall development and influences the uptake of other essential elements. Depending upon the treatment process, calcium in the water used by the greenhouse operation can be increased or decreased by the addition of the above mentioned compounds.

Connecticut water supplies are generally very low in calcium. Sodium displaces calcium in the cation exchange complex. Even low levels of sodium, applied at every irrigation, could contribute to calcium insufficiency as well as suppress potassium uptake. Because the concentration of an element in the soil solution normally dictates plant uptake, the addition of higher concentrations of an element can pose potential problems (1). This is an important consideration where sodium may dominate over calcium or potassium in the treated water.

Sodium is not an essential element for plant growth. Although it may be a prime component in the water treatment process, concentrations are not regulated by the SDWA. However, many states, including Connecticut, have established 20 ppm as the acceptable limit. At this concentration sodium ions may replace some calcium ions on the exchangeable surface, but it does not appear to be a major concern. For example, the relative uptake of sodium to potassium will be enhanced in the presence of sodium (3). Detrimental levels of sodium in greenhouse irrigation water have not been established. Any sodium may have an effect if a competition ion such as calcium or potassium is minimally present.

Chlorine is a minor essential element for plant growth. Excessive levels of chlorine can inhibit enzyme activity in the soil and plant systems, a process which is essential for metabolic action (4). In water treated with chlorine to control bacteria, secondary drinking water standards, which are recommended but not federally enforceable, allow up to 0.25 ppm chlorine in the treated water. Information is not

Beth Arvidson, Student and
Jay S. Koths, Professor of Floriculture

Strelitzia, commonly known as the Bird-of-Paradise, received its name in honor of the wife of King George III, Charlotte Sophia of the family of Mecklenburg-Strelitz, a supporter of botany (Anon., 1956). The Bird-of-Paradise (*Strelitzia reginae*) has great consumer appeal due to its unique exotic bloom with long-lasting qualities. It has relatively few pest problems. In New England it should be considered as a show plant in a retail greenhouse or in a conservatory.

Because of the high cost of cultivating *Strelitzia*, until the 1920's this plant was grown only on the estates of the wealthy (Anon., 1956). Now, however, the cultivation of this plant is widespread. In the U.S.A. this native plant of South Africa is grown in the fields of southern California and in conservatories throughout the country. It may be grown in pots for home use.

The genus *Strelitzia* consists of several species (*augusta*, *Nicolai*, *parvifolia* and *reginae*) all of which are members of the banana family (Musaceae) (Anon., 1956). The species most commonly used for ornamental use and cut flowers is *Strelitzia reginae*.

Strelitzia reginae is a large trunkless plant with oval leaves. The spike from which the flower is formed can reach a height of 5 feet or more. The flower is unusual in appearance. Green, red, and/or purple canoe-shaped bracts, which reach lengths of 4-8 inches at maturity, give rise to a bright yellow or orange floret. This brilliant floret is complemented by dark blue inner petals. *S. reginae* flowers are not only extraordinarily beautiful, they are also versatile and as a cut flower can last up to 15 days.

The flowering cycle of *S. reginae* is seasonal, with blooms beginning in September and ending in May. Following the general rule of peaks and declines for *S. reginae* the blooms first peak in December, then taper off until a second peak is reached in February or March (Anon., 1956).

*Presented as a paper in Plant Science 298, Greenhouse Crop Production.

Studies have revealed that photoperiod has no effect on flower initiation (Halevy, 1976).

The seeds should be kept in a cool dry place until time for planting. It is important to protect them from mice. The seeds should be soaked in hot water (142°F) prior to planting to improve germination (Besemer, 1976). This procedure may also provide sanitation benefits. The next best treatment is a five minute soak in sulfuric acid. An adequate germination medium for S. reginae is vermiculite with 70^o-75^oF bottom heat.

Seeds take two and one half months, sometimes longer, to germinate. It has been found that even at the low light intensity of 100 footcandles (fluorescent light), a 4" seedling will attain a bright green color (Besemer, 1976). It is three more years before Strelitzia will produce blooms and then another five years before a good Strelitzia plant produces the type of flower desired for commercial sale.

The best method of propagation is either by manual division of large clumps or by propagating offshoots (Anon., 1956) in late spring to early summer. Root rot may occur more frequently in cold weather. Also, when dividing, enough of the original root should be left on the plant to assure healthy growth (Anon., 1956).

It is important that the plants not be planted too deeply. The juncture of the stems and roots should be level with the soil surface. After planting, three months may elapse before new growth begins (Anon., 1956).

S. reginae requires a moderate amount of water at all times, yet the soil should not reach the point of sogginess. To attain a greater number of blooms and to encourage growth, organic fertilizers such as blood and bone meal may be placed around the plant about every three months.

S. reginae has few pest problems. The more common ones are aphids, ants, a worm similar to the corn borer, mealybugs and scale insects.

A night temperature of 50-55^o is sufficient but they do well in conservatories at 60^o or even 65^o. Except for the late spring and summer when partial shade should be provided, they appreciate direct sunlight.

From September through May, flowers are cut daily as the first floret opens. Recent research has shown promising results for cutting flowers in the tight bud stage and

Roy Jeffrey

Community Resource Development and Agricultural Agent

Summary

The treatment of public water supplies to meet requirements of the Federal Safe Drinking Water Act has raised questions about the suitability for watering plants in greenhouse production as well as in homes and public buildings.

Chemical compounds containing sodium, chlorine, aluminum and calcium are used at water treatment plants for pH control, coagulation and bacteria removal.

Although added in varying amounts, it appears that levels of sodium, chlorine and calcium found in treated water fall within tolerable limits for most greenhouse plants. However, the complex dynamics of nutrients in the soil and plant solution raise a number of questions about the use of treated water. Of particular interest is the possible replacement of sodium for calcium, thereby affecting nutrient uptake, and of chlorine's impact in limiting enzyme activity. There does not appear to be research which clearly demonstrates acceptable long term effects on plant or defines concentrations.

Text

Drinking water contamination has become a major concern of the general public. Demand for improved water quality has prompted government and industry to spend millions of dollars on improved water treatment systems.

Many greenhouse operations in the Northeast rely on public supplies as the sole source of water for irrigating plants. Consequently, the quality of such treated water and its impact on plant development is of prime importance.

Design of most public water treatment systems is guided by provisions of the Federal Safe Drinking Water Act (SDWA) and applicable state regulations which require or recommend that certain standards be met through the removal of various contaminants.

To meet the water quality standards, a number of processes can be employed including filtration, reverse-osmosis and chemical additions. In the Northeast,

Federsee, Mainz, Peach Blossom and Rheinland; White: Aulanche, Deutschland, Gladstone and Irrlicht. Sunny Border Nurseries (Kensington, CT) cultivar suggestions include, in addition to many of the above, (red) Spinel, Bonn, Fever and Glut, (pink) Sprite and White Gloria.

If possible, grow only dwarf cultivars, as some of the normal garden types are three feet tall. Tall cultivars can be contained by applying two 5,000 ppm daminozide (B-Nine or alar) sprays one week apart, when the spike begins to elongate.

Spider mites and aphids may infest astilbe. Kelthane or Pentac should control the spider mites and Thiodan, Pirimor, or Malathion the aphids. An application of Temik (aldicarb) should control these pests and provide incidental control of nematodes which have been reported to be a problem. Two diseases sometimes occur; powdery mildew, controlled by Karathane or Benlate and root rots, controlled by Banrot or a Truban - Benlate combination drench.

Caution: Do not use nicotine or cyanide, as they have been reported to cause foliage damage.

Astilbe should be sold when the inflorescence (plume) begins to show color. Make sure that you tell your customers that these perennials may be planted in the garden to provide years of enjoyment.

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increasing the storage period up to one month. This has been done by "pulsing", a procedure to load the flower tissue with sugar and other chemicals before shipment. The best pulsing solution has been found to be 10% sucrose, 250 ppm hydroxyquinoline citrate and 150 ppm citric acid. The tight flowers are kept in this solution for 2 or 3 days at 22°C (70°F). This not only improves the opening and longevity of the flowers but also gives the added advantage of handling bud-cut flowers. Dipping or spraying blooms with 200 ppm benomyl or thiabendazole before shipping or storage overcomes the problem of bract lesions and floret browning due to botrytis. The cut flowers can withstand storage up to four days at 10°C. Prolonged storage after this point is not advisable (Halevy, 1978).

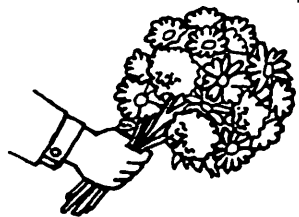
S. reginae is a plant with unique blooms. Because of its special qualities, retailers and consumers can take pleasure in the exotic Bird-of-Paradise.

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A TIP

Non-stop begonias are like tuberous rooted begonias in that the flowers point in the same direction as the leaves. When planting non-stops in hanging baskets, place the plants with leaves pointing out. The display of flowers will be improved significantly.



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When our students make a mistake in the floriculture greenhouse, it is looked upon as a learning experience. Better here and now than later when big dollars are at stake.

Commercial support of university research is essential to progress. This is especially true in floriculture where basic research grants from governmental sources are hard to obtain.

A bouquet to IMCC for the message and many thanks to all of you who support floriculture research at the University of Connecticut.

Greenhouse Operating Costs

Jay S. Koths
Extension Floriculturist

The average may be \$11.00 per square foot per year!

Actually, some greenhouse operators may spend as little as \$7.00/sq.ft./year, others more than \$15.00. Keep in mind that this is total operating costs including heat, labor, materials such as root media and propagating stock, containers, insurance, bookkeepers for governmental red tape, and every conceivable expense.

This must be pro-rated for the proportion of the year that the greenhouse is in production. For instance, a bedding plant greenhouse operated for 4 months, at a cost of \$4.00/sq.ft. would be rated at \$12.00/sq.ft./year.

Mulling over these figures, it would seem that \$11.00/sq.ft./year is a reasonable figure. This can be applied to the total area in Connecticut greenhouses to obtain a minimal return which will simply pay the bills.

ASTILBE*

Allen C. Botacchi
Coop. Ext. Horticulture Agent

Astilbe japonica, misnamed "spirea", is also known by some suppliers as "ostrich plume". This perennial plant also may be grown as an attractive pot plant. It is normally forced from March to early May.

Fall dug Astilbes can be forced after they have received at least 6-12 weeks storage at 35-45°F to break dormancy. It is suggested that forcing crowns have 3 or more eyes.

Traditionally the pre-cooled crowns are potted into 5 to 8 inch pots 10 to 14 weeks prior to sale. Roots are not pruned prior to potting, but are forced into the pot.

A porous, well drained mix with good water retention is suggested. Add some extra peat moss. The pH should be 6.0-7.0 according to DeHertogh (1984) but Bennerup (1985) reports that limestone is not required.

Maintain uniform moisture by placing the crop on a capillary mat system or use automatic watering. Greenhouse humidity should be kept high to insure good breaking and flower spike development.

Liquid feed with a complete NPK fertilizer.

Force at 60°F for 10-14 weeks, depending upon cultivar. Generally the pink cultivars force easier than the reds which force easier than the whites.

Cultivars suggested by DeHertogh (1984) for trial forcing include:

Red: Etna, Fanal, Koln, Koblenz, Montgomery,
Red Sentinel and Vesuvius; Pink: Bonn, Bremen, Europa,

* Based in part upon a paper presented by Stephen LaVander and Brenda Johnson in Plant Science 298, Greenhouse Crop Production.

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Our current survey places the total greenhouse area at 6,530,000 sq.ft. (not including nursery greenhouse). This is 8% above 1985, 14% greater than 1981. The best guess that we can make places utilization at about 75% of the year. This gives a total cost of operation at \$54,000,000 per year. This is the amount placed in the following list of values for Connecticut Horticulture without allowance for profit. 190 Acres

These estimates are rough. If you can help provide a more valid estimate, please let me know.

Connecticut Horticulture

Jay S. Koths
Extension Horticulturist

Last March we published data indicating that the gross sales of our horticultural industries was in excess of a half billion dollars. This was difficult to believe. Additions and some corrections were made.

THE TOTAL IS NOW NEARLY 3/4 BILLION DOLLARS.

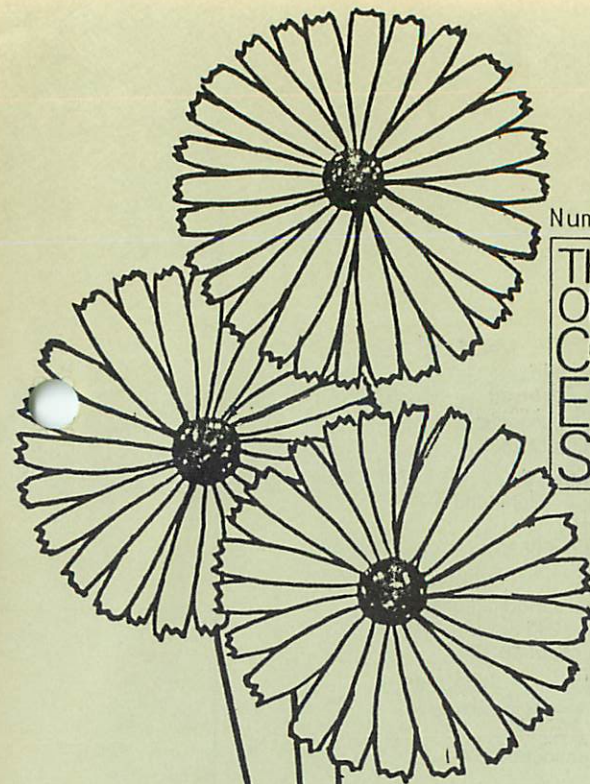
Do you believe this? If not, please provide us with more accurate figures.

Apples, pears and peaches	\$ 15,000,000	(Kollas, 1985)
Arborists	40,000,000	(Stephens, Marrotte)
Athletic facility maintenance	15,000,000	(Maisano, 1985)
Cemetery landscaping	?	
Christmas trees	6,000,000	(John Olsen)
City parks	46,000,000	(Dest, 1985)
Florist supply firms	20,000,000	(Harper, 1983)
Florists, retail	49,000,000	(CT census Data, 1982)
Garden centers (no hardware)	200,000,000	(Carpenter)
Greenhouse	54,000,000	(Koths, 1985)
Golf course maintenance	25,000,000	(Dest, 1984)
Home garden production	5,000,000	(Garden Way)
Home landscaping	?	
Lawns	106,000,000	(Dest, 1985)
Industrial landscaping	?	
Landscape contractors	70,000,000	(Maisano)
Mushroom	?	
Nursery	45,000,000	(Corbett, 1984)
Small fruits	5,000,000	(Kollas, 1985)
Sod	?	
Vegetables	30,000,000	(Ashley, 1985)

\$731,000,000

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