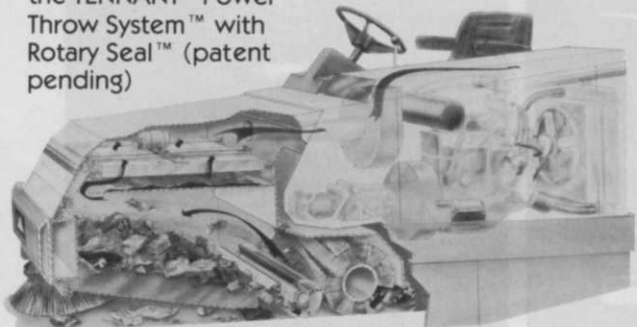




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**A**ccuracy and economy are two major reasons for increased attention to sprayer calibration today. Overapplication and drift lead to waste and possible damage. Underapplication prevents chemicals from doing their job and wastes time and money in reapplication or touch-up.

You may be doing everything right as far as mixing, calculation and application, but your equipment may need adjustment.

The introduction of foam and dye marking agents is helpful and may reveal problems with spray equipment. However, it's very important to check spraying equipment regularly for accuracy.

A basic understanding of spray equipment, spray nozzle patterns, and flow rates can help you keep your spraying equipment accurate and reliable.

### Nozzle selection

With a regular flat fan nozzle, commonly used in agriculture,

you have to overlap to get even coverage of a chemical.

A hollow cone nozzle is used where thorough coverage is needed, such as for fungicide applications. This nozzle is effective in drenching leaves during application.

The two nozzles used most often in turf are the flooding flat fan and the raindrop nozzle.

The flooding flat fan is not a very uniform pattern and must be used with large gallonages of water. It is used in turf for applying fertilizers and fungicides applied in large amounts of water.

The raindrop, a new type of nozzle, is like a hollow cone but modifications allow you to spray at a reduced pressure and still provide a very good pattern. This nozzle will reduce drift compared to a normal flooding flat fan nozzle since it can be used at lower pressure. It is good for applying herbicides.

For example, the regular flat

fan is made to operate at 20 to 40 pounds per square inch (psi). At 40 psi the nozzle produces a fair amount of very fine particles which are subject to drift. The new raindrop nozzle is designed to provide the same distribution at 15 psi as the flat fan nozzle at 40 psi. The result is larger particles and reduced potential for drift.

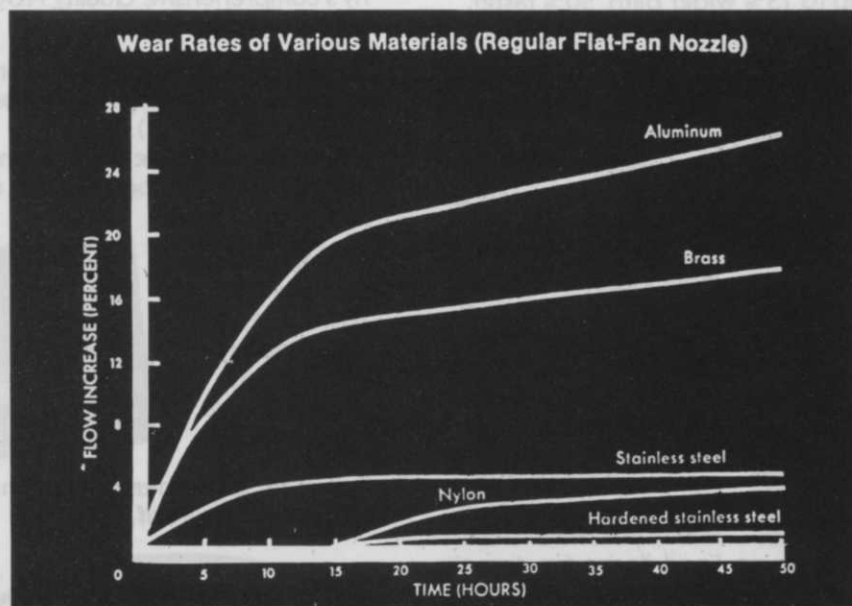
Tests performed at Michigan State University have shown that the pattern of a flooding flat fan nozzle is not very uniform and requires a 100 percent overlap with a boom sprayer.

A flat fan nozzle has a bell-shaped distribution which provides a nice straight uniform pattern with a boom sprayer. Overlap with a flat fan nozzle should be 30 to 50 percent.

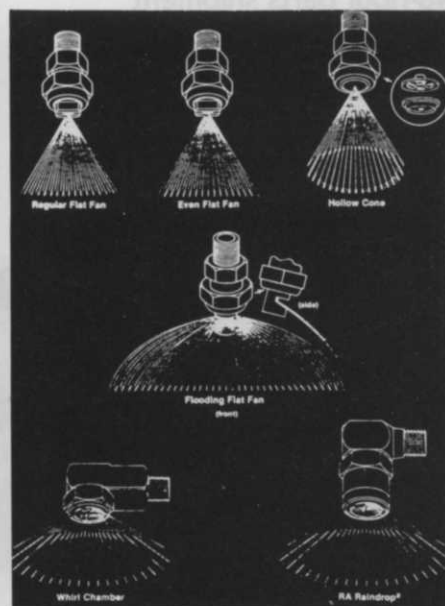
Overlap is determined by comparing the distance nozzles are apart on the boom with the width of the pattern on the ground. One hundred percent overlap means the the width of the pattern on the

# Simplified Calibration of Boom Sprayers

by Bruce Branham, assistant professor, Michigan State University, East Lansing, MI



Nozzle wear by type of material.



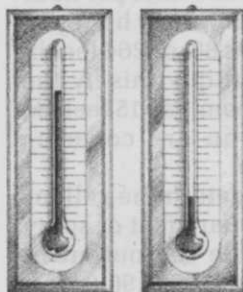
Spray patterns for standard nozzles used in turf and agriculture.

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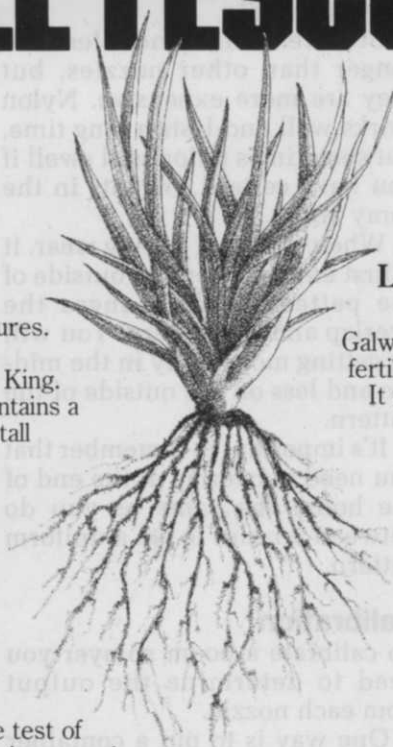


**Improved performance against disease and extreme temperature.**

In development, Galway passed the test of fierce Minnesota winters and sweltering Midsouth summers.

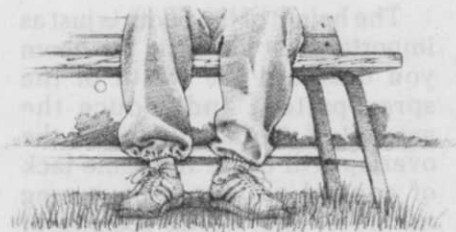
It passed the test at several northern and southern universities, too, ranking among the best turf-type tall fescues available.

Tests have shown that it won't succumb to brown patch or net blotch. And that its improved shade tolerance makes it well suited for use under trees and in other low-light areas.



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Hand-held device measures flow from a single nozzle instantaneously.

ground is twice the distance the nozzles are apart on the spray boom. You can determine this by closing all the nozzles but one on the boom and checking the width of the spray on the ground.

When you don't have proper overlap there will be strips

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### The output of a brass nozzle changes in less than 20 hours of spraying.

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between nozzles where the dose isn't high enough to provide control.

The height of the boom is just as important. By lowering the boom you decrease the width of the spray pattern and reduce the amount of overlap. Reducing the overlap will cause the same lack of control as using the wrong nozzle or the wrong spacing of nozzles on a boom.

Nozzles will wear down with time and allow more material through. This depends on the material the nozzles are made of. The flow of material will increase from the nozzle as it is used. If you spray a great deal you will be changing the gallonage you put down.

Standard nozzles are made of brass. Studies show that flow increases about 16 percent after 20 hours of spraying. After 50 hours

the flow increases 20 percent from its original rate.

Wettable powders will wear open the nozzle orifice faster than other materials.

Stainless steel nozzles last longer than other nozzles, but they are more expensive. Nylon works well and lasts a long time, but sometimes nylon will swell if you have certain solvents in the spray tank.

When you start getting wear, it is first exhibited on the outside of the pattern. This changes the overlap and the pattern. You will be getting more spray in the middle and less on the outside of the pattern.

It's important to remember that you need to overlap at the end of the boom the same as you do between nozzles to get a uniform pattern.

### Calibration

To calibrate a boom sprayer you need to determine the output from each nozzle.

One way is to put a container under each nozzle, turn the sprayer on for 30 seconds, and measure what is in each container. The output of each nozzle should be within five percent of the average output of all the nozzles. Nozzles that don't meet this requirement should be removed and cleaned or replaced. Never use a metal object to clean out a nozzle orifice. Use a soft wooden toothpick. Once a nozzle is cleaned, test it again.

A device is now available which quickly measures the output from each nozzle, one at a time. It is placed under the nozzle and reads the flow rate in seconds. It's like a hand-held calculator with a tube.

The device shows output in gallons per minute. It is accurate to one hundredth of a gallon and

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### A simple, hand-held meter makes sprayer calibration much simpler.

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costs about \$70 dollars. It's much faster to use than the standard method.

There are many ways to determine the output per thousand square feet to check application rates. The easiest way is first to figure how much water is coming out of one nozzle per unit time (in gallons per minute). Multiply the output of this nozzle by the number of nozzles on the boom. This produces the total output of the boom in one minute.

Now you have to determine how much area you cover in one minute of spraying. First determine your width of spray and travel speed. You know how wide the boom is. If you know rate of speed you can figure 88 ft. per minute for each one mile per hour speed. At three miles per hour you cover three times 88, or 264 feet in one minute. Multiply this by the width of your boom, say 15 feet. So each minute you are covering 3,960 square feet.

You want to determine gallons per thousand square feet of spray applied, so divide the output in gallons per minute by 3.96 (thousands of square feet). Since you know the volume of solution applied and the amount of chemical per gallon in the tank, you can determine the amount of chemical applied per thousand square feet.

You should check your sprayer output periodically to see if it has changed. Remember, nozzles wear down in just hours of spray time. **WT&T**

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Look into one of these new John Deere walk-behind mowers.

It may be just the answer for your toughest mowing jobs.



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Circle No. 116 on Reader Inquiry Card

# Practical Guide to **FLOWERS** in the Landscape

by Ann Reilly, consumer affairs manager, Bedding Plants Inc.



*Geraniums in Seattle's Freeway Park provide a warm and inviting contrast to green foliage.*

**R**eal men don't like to work with flowers. Just saying the words dahlia, impatiens, marigold, pansies, or petunia makes them cringe.

The fact is the popularity of bedding plants has grown greatly in the past decade. Managers of commercial, institutional and recreational facilities want flower beds in front of buildings, in parking lots, on tees, and in parks.

Questions about the labor and maintenance involved with planting annual flowers are constantly being raised, especially from those who have not dealt with them before.

These questions cover the gamut of flower bed design, plant selection, planting and care. What annuals are best for dry soil...wet soil...hot locations...shaded locations? What are the best low maintenance annuals?

### Design

Design limits are set by available space, size, soil conditions and light. Keep plant heights in proportion to the size of the flower bed and surroundings. Low-growing flowers do best in small spaces.

Varying sized flowers should be chosen where height is needed, in expansive plantings, or against tall backgrounds. Three different heights of bedding plants are recommended; ground cover in front, tall flowers in the background or center, and medium tall plants in between.

There are three basic plant shapes; spikes, mounds, and ground covers. A mixture of all three is most interesting.

Color is very important. Choose a prominent color and carry it throughout the design in different shades and tones. Colors should compliment each other. A color wheel will help you select combinations.

Use bright colors, such as red and orange, with discretion since they attract the eye. Warm tones of red, orange and yellow are exciting colors, whereas blues and violets are more tranquil and make the garden appear larger.

Planting plans should include spacing between annuals. For example, if plants are eight-

inches apart, each plant will occupy 64 square inches of bed space. Divide the area to be planted (in square inches) by 64 to determine the number of plants needed.

### Planting

Order plants in advance from your local bedding plant supplier. It is possible to find a local grower willing to grow your bedding plants under contract.

Prepare planting beds in advance, incorporating peat moss or other organic matter and a complete fertilizer such as 5-10-5 into the soil at that time.

Water both the planting bed and the plants well before plant-

ing, and set them in the ground at the same level at which they grew in the pack or flat. It helps to plant annuals on a cloudy or overcast day to reduce transplant shock.

A drip irrigation system provides the easiest maintenance system and use the least amount of water.

A two-inch layer of mulch of shredded leaves, pine needles or bark will not only add an attractive touch, but will conserve water and reduce weeds.

If space is limited, consider container plantings and hanging baskets. For containers use a dwarf, compact variety that will compliment the size and color of the container.

WT&T

## 21 Popular Annuals for Landscapes

**Ageratum**—Small fuzzy blooms of blue, violet or white that fall cleanly and don't need to be pinched when faded. Do well in full sun or part shade. They do well by themselves as a carpet of blue or white or as edging to larger growing plant material. They grow 6 to 12 inches high, stay compact, and are a good contrast to pinks and yellows. Plant only in the spring or fall in hot, humid areas. Recommended varieties are Blue Blazer, Blue Puffs, North Seas, Blue Danube, or White Spindrift.

**Begonia**—Popular for shade. Non-stop flowers of white, pink or red over green or bronze leaves. Modern wax (or fibrous) begonias will do well in the sun provided they receive more water than normal and the temperature generally doesn't exceed 90 degrees F. Where heat and humidity are high, choose the bronze-leaved types. Varieties include Scarletta, Scarlanda, Bingo, Mars, Vodka, Whiskey, Gin and Brandy. White or pink Avalanche begonias

are outstanding for hanging baskets.

**Browallia**—Little-known browallia makes an ideal low-growing, trailing annual for the shade. It likes cool, moist situations. Flowers are star-shaped in blue and white. Varieties include Blue Bells, Marine Bells, or Silver Bells.

**Celosia**—The plumed or crested type of this brightly-colored flower will add a touch of fire to the landscape. Due to its startling color, celosia needs to be used in careful and limited amounts. Don't plant too early because cool temperatures force it to go to seed and discontinue flowering. Look for Apricot Brandy, Jewel Bow or Geisha.

**Coleus**—Great for shade and under trees. Fast and easy to grow, coleus leaves can be shades of green, yellow, red, pink, and white with blotched, mottled or striped patterns. Pinch off flowers in later summer to keep the plants vigorous through fall. Dwarf types are Carefree, Wizard, and Saber. Larger types are Rainbow,

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Dragon, and Fijis. For containers plant Carefree and for baskets plant Saber mix or Scarlet Poncho.

**Dahlia**—For a multi-colored mass planting, dahlias grown from seed make a good display. Using tubers instead of seed is labor intensive. Seed varieties, generally dwarf and mixed colors, can be dug each year and saved but reseeding is easier. Popular varieties include Rigoletto, Redskin, Unwins, and Figaro.

**Dianthus**—Often known as pinks and sweet williams, dianthus are becoming more resistant to heat. The Charm series, Queen of Hearts, Princess Scarlett and Snowfire will give the best, low growing, compact performance.

**Dusty Miller**—The silver, grey and white tones of the leaves of dusty miller make it a useful filler and buffer between flowers or plants of contrasting color. It tolerates heat, drought, and light shade. It's effective in areas used at night, reflecting artificial lights and moonlight. Remove flowers if they begin. Try the varieties Silver Dust or Silver Lake.

**Geraniums**—Geraniums prefer sun, lots of water, frequent feeding and removal of dead flower heads. They are not a low-maintenance flower. They are grown from cuttings or from seed. Select cutting types for containers and seed types for beds. In hotter areas, seed types are more resistant to heat stress and do not fade as much.

Lighter colors are better in parking lots and other areas used at night. Pastels and bicolors are good for up-close areas. Salmons and reds are best for massed plantings and those beds that are viewed from a distance.

Orbits are low-growing, Sprinters spread, Rings are

early-blooming and compact, and Gremlins are dwarf. Mustang is bright red. Steady Red is a strong double-flowered seed variety.

**Impatiens**—Impatiens are still one of the best bets for shade. It's also one of the easiest annuals to care for. They like a moist soil and benefit from extra peat moss in the soil.

They come in many colors. It's best to plant a few complementary tones than a rainbow of many colors. They also come in different heights. Short varieties are Super Elfin, Princess and Sherbert. Medium-size are Cinderella, Novette, Shade Glow, and Futura. Tall impatiens are Blitz and Grande. Showstopper or Futura are good for hanging baskets.

**Lobelia**—Where summers are hot and humid, plant lobelia in partial shade. In cool areas put them in full sun. Nothing compares to the intense purple-blue of Crystal Palace that hugs the ground with dense, trailing plants smothered with flowers. Use as a ground cover, edging, or atop walls.

**Marigolds**—Marigolds are available in yellow, cream, copper, gold and red and in a variety of heights. The taller types are the African marigolds and often will not bloom until late summer. Dwarf marigolds are the French. Triploid crosses produce large flowers on dwarf plants for a longer season.

Marigolds like sun, not much fertilizer, and average soil. They look neater if dead flowers are removed.

The dwarfest are Bonanza, Boy, and Janie. Next in line are the Queens (Sophia, Beatrix, and Victoria). A new series, the Incas, grows 12- to 16-inches high and has large, full flowers on compact plants.

The tallest are Galore, Lady, Jubilee and Gold Coin. These may need to be staked.

**Pansies**—Pansies are cheerful where summers are cool or for spring and fall accents. They come in shades of purple, blue, yellow, rose and white. They like sun but not hot air. Good varieties are Crystal Bowl, Majestic Giants, and Universal.

**Petunias**—The number one selling class of annuals, petunias come in a wide assortment of colors and combinations. They perform all summer with full sun and pinching back. They don't mind heat or drought and do well in sandy sites.

There are basically two types: grandifloras and floribundas. Grandifloras have larger flowers but can be ruined by summer rains. Floribundas have more flowers, are more weather tolerant, and are botrytis resistant.

For containers try the grandifloras Crockett's Victory White, Cascade, Flash, Cloud, Sail or Magic. Floribundas are better for massing in beds. A new petunia is Summer Madness. Also good are Blue Cheer, Joy, Plum, and Summer Sun.

**Portulaca**—Portulaca is effective as a low-growing plant where it is hot, the soil is dry, sandy or rocky, and it doesn't rain often. Sunnyside, Sunglo and Alypso produce flowers of orange, red, pink, rose, white, yellow, coral, and orchid.

**Salvia**—For sun and part shade, salvia provides spikes of bright red, creamy white, and intense blue for massing or accents. Use red carefully. Although salvia will tolerate drought, they do best if well-watered.

Try the Carabinieres, Red Hot Sally or St. John's Fire

for low growing types. For tall plants, choose Red Pillar, America, Bonfire, or Splendens Tall. There is a new coral salvia called Champagne, part of the wine series with Burgundy and Chablis.

**Snapdragons**—Choose snapdragons only if you have the labor to pinch young plants once before they flower and to remove spent flowers. If this is not done, the plants will not be compact, but spindly and won't bloom uniformly.

Colorful snapdragons come in a variety of heights, but the shorter types like Floral Carpet or Pixie would be very suitable for massed planting beds.

**Spider flower**—Known botanically as Cleome, this is the annual to choose where you need something tall at the back of a planting,

against a fence, or to camouflage an eyesore.

Mass it together and it almost looks like a shrub. It withstands heat and drought, doesn't need staking and is relatively trouble-free. Best-known varieties are Rose Queen and White Queen.

**Sweet Alyssum**—A good low-maintenance annual, sweet alyssum is low-growing, spreading and especially good used informally as edging, along paving stones, in rock walls, as ground cover or as a low border. It will tolerate heat and drought and is fragrant as well. Select White Carpet of Snow, violet Royal Carpet or lavender Rosie O'Day.

**Vinca**—Where heat and humidity are the norm, vinca is one of the best annuals, tolerant of sun or

part shade. Vinca withstands drought although it prefers to be kept moist. Foliage is glossy and crisp flowers of white or pink resist insects, pollution and heat. The Little series is well-known. Magic Carpet is a new variety with individual flowers of pink, white and rose.

**Zinnia**—Zinnia comes in many flower colors and shapes. It is good to solo or to mix with other flowers. Mildew is a problem, so plant in a hot, sunny spot where air circulation is good and keep water off the foliage as much as possible.

Good low growing types include Border Beauty Rose, Peter Pan, Pulcino, Short Stuff, Thumbelinas, and Small World Cherry. Taller varieties include Bib Top, Fruit Bowl, Ruffles and Zenith. □

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