In the Greenhouse

By John A. Biernbaum, William H. Carlson, and Royal D. Heins

Fertilization Strategies for Bedding Plants

WHAT kind of a bedding plant crop will you produce? Stunted, underdeveloped, chlorotic plants? Overgrown, vegetative, unmanageable plants? Or salable, vigorous plants at the proper height with healthy green foliage and uniform flowers?

Fertilization and irrigation are two vital variables that can make this difference. They affect growth rate, time to flower, post-production handling and keeping quality. Proper attention to these variables is fundamental to the success of your crop.

Recent studies at Michigan State University (MSU) have documented the importance of bedding plant fertilization strategies. Bedding plants require relatively small amounts of fertilizer. But even though these amounts are small, they must be present in the right quantities at the right times to produce the best crop.

There are three main methods of fertilizing bedding plants:
- Incorporating nutrients into the medium before planting;
- Applying a soluble fertilizer in the irrigation water after planting; and
- Using slow-release fertilizer, either mixed in the medium before planting or applied as a top dressing after planting.

Incorporating Nutrients Before Planting

The initial level of nutrients available to bedding plants has a major effect on their early growth and development. While many of the commercially available soilless media have similar physical properties, their nutrient charge and pH levels can vary significantly. As a grower, you must know the nutrient and pH levels in your medium and adjust your fertilization program to get your plants off to a good start.

If you mix your own soilless medium, you can provide the initial nutrient charge the same way it is provided in most commercial media, by incorporating one of the following combinations of nutrients per cubic yard of medium:
- 2 to 4 pounds of a complete fertilizer, N P O K (10% to 15% each)
in addition to an application of micronutrients, and lime as needed, or
- 1 pound KNO₃, 1 pound Ca(NO₃)₂, 2 to 3 pounds of superphosphate (0-20-0), 0.5 pound MgSO₄, a source of micronutrients, and lime as needed.

This pre-plant nutrient incorporation is a major portion of the total nitrogen and potassium needed by bedding plants during a typical five- to eight-week production period. The pre-plant nutrients provided by 1 pound per cubic yard each of KNO₃ and Ca(NO₃)₂ is 30% to 50% of the total fertilizer required by a typical bedding plant crop. For certain crops with low nutrient requirements, such as impatiens, these pre-plant nutrients may supply as much as 80% to 90% of the total fertilizer required.

In our bedding plant fertilization experiments at MSU, we used four media: three commercially available soilless mixes manufactured in Michigan, and a 1:1:1 mix of peat, perlite, and sandy loam field soil. We produced good quality bedding plants in all four media using a variety of fertilizer treatments.

Early growth was most rapid with 3 to 4 pounds per cubic yard of a complete fertilizer with micronutrients. Plants grown with no additional nutrients incorporated into the medium were smaller, slower to develop initially, and did not flower any earlier.

The effect of the pre-plant charge is best illustrated by the growth of marigolds when no additional liquid fertilizer was applied (see photo). Even when liquid fertilizer was added, the initial pre-plant fertilizer incorporated had an obvious effect on the growth and final quality of petunias and impatiens.

Liquid Feed

The functions of a liquid fertilization program for bedding plants are:
- To give the crop a strong start with a moderate to high rate of fertilizer immediately after transplant;
- To control growth and hasten flowering by reducing the fertilizer level as the crop matures; and
- To provide for post-production keeping quality by adding a moderate amount of fertilizer just before the crop is shipped.

To determine specific rates of fertilization, take care in consulting published sources such as extension publications or reference books such as...
**BEST VALUE IN BELT DRIVE FANS**

New AAA Greenline

Best original cost for comparable quality
Best efficiency (CFM/watt) without gimmicks
- 36, 42, and 48" sizes, ½ to 1½ hp motors
- High efficiency motors perfectly matched to steel props
- Durable polyethylene fan housing — no rust or corrosion
- Strong galvanized motor mount
- Automatic belt tightener insures constant performance
- Full 1" drive shaft instead of usual ¾"
- Cast iron pillow blocks maintain shaft alignment — no cheap stamped steel
- Quality 1" bearings for long life
- Plastic shutters mount inside galvanized wall housings for maximum efficiency
- Vinyl coated steel guards
- Guards and shutters attach with AAA "Quick Release" — no bolts and nuts to remove

Compare any fan from any other manufacturer — you'll choose AAA.

**AAA Associates Inc.**

1445 S. 3rd
Greenhouse Division
Niles, Mich. 49120

CALL TOLL-FREE 1-800-426-3267 (Mich. 616/684-4073)

For Details Circle No. 12 on Postcard

---

**Bedding Plants III**, the Penn State Manual, third edition. Chapter 15 offers a complete discussion of bedding plant nutrition which recommends 150 to 200 ppm nitrogen and potassium when applied as constant liquid fertilization (CLF) and 240 to 300 ppm when applied as weekly liquid fertilization (WLF).

It is important these recommended rates be adjusted based on a variety of cultural and environmental factors. These high rates are rarely used commercially in Michigan — and with good reason. When we used these rates for our research experiments in April and May with high light and high water requirements, the plants produced were generally too large.

Many growers in Michigan use 250 to 300 ppm nitrogen when fertilizing, but rather than CLF or WLF, this rate is used on an as-needed basis. Usually one application is made every 10 to 14 days, depending on environmental conditions. Our tests at MSU showed no significant differences between the plants grown with 150 ppm CLF or 300 ppm. However, plants may grow too large before the grower recognizes the need to reduce CLF fertilizer levels.

**Know Your Media Nutrient Level**

One factor to consider when adjusting recommended fertilizer levels for your own production conditions is the nutrient level of your medium. Media with a normal amount of nutrients incorporated before planting may not require liquid fertilizer for several weeks after planting. However, media with little or no pre-plant fertilizer may require liquid fertilizer immediately. Many growers are watering plants in with 200 to 300 ppm N and K levels in the water to provide adequate starting nutrient levels.

Another factor is your irrigation method, both with and without liquid fertilizer added to the water. Experts recommend watering so that some excess water leaches from the flat in order to prevent the accumulation of fertilizer and soluble salts. In common practice, however, most growers do not leach but water lightly on a more frequent basis. This practice of growing the crop "dry" results in higher levels of nutrients and soluble salts remaining in the medium.

Consequently, you should reduce the recommended concentrations of applied liquid fertilizer if you water without leaching.
MECHANICAL'S MODEL 806 TWIN-ROW TRANSPLANTER

The Model 806 has a rugged framework that offers complete flexibility for different row spacings, row centers or change from 6-rows to 3-rows in minutes. The 806 has three transplanters on the front toolbar, two tanks on a center trailer frame and three more units on the rear toolbar, all with complete adjustability. The whole unit is controlled by remote equalized hydraulics from the tractor.

The 806 frame combined with our Standard 22C Units or the new High Performance Model 1000 Transplanters gives the grower the fastest, trouble free twin row available.

Write or phone today for more information from the leaders in Transplanting:

MECHANICAL TRANSPLANTER CO.

1150 S. Central Ave. • Box 1708 • Holland, MI 49422-1708 • 616-396-8738

THERMAL TUBES

Season Extender from KEN-BAR INC.

The Thermal Tube is made from high quality polyethylene and when filled with water, functions as a heat collector. The water absorbs the sun's energy during the day.

During the winter months, the Thermal Tube utilizes stored solar energy to raise the soil and air temperatures during the night.

Thermal Tubes are for use in unheated field tunnels and are available in rolls 31" wide x 333 ft. long. There is an 8" wide planting strip between the two tubes. The material is 8 mil with U.V. protection and will last 2-3 seasons. Weight per roll is 67 lbs; price per tube is $98.00

Call or write for info:

KEN-BAR

24 Gould St., Reading, MA 01867  (617) 944-0003

For Details Circle No. 50 on Postcard

SLOW RELEASE FERTILIZER

Over 15 years ago, MSU demonstrated that bedding plants can be successfully produced using slow release fertilizer (SRF) as the sole source of nutrients. Another option is to combine a lower rate of SRF with supplemental liquid fertilizer.

We tested a new resin-coated fertilizer, Controlled Release Nutrients (CRN) with macronutrients (17-6-12) and trace elements. We compared it to Osmocote (19-6-12) with Micromax incorporated as a source of micronutrients and found no significant differences.

One of the most important results of our test was that plants grown with SRF as the sole source of nutrients were of equal or better quality than plants grown with SRF plus liquid feed or with liquid feed alone. Plants grown with SRF alone were shorter and flowered one to two days earlier than the others.

We also found that the incorporation of SRF did not excessively increase plant height. In media with a low base nutrient charge, SRF produced good quality plants without significant differences in height. We plan further tests of SRF during the low-light periods of the year to see if light effects these findings.

In light of these findings, the best fertilization strategy would be to rely on SRF to provide the major portion of nutrients required, supplementing it with liquid fertilizer only if conditions warrant. For instance, a crop may need a fertilizer boost toward the end of the growing cycle due to weather conditions or watering frequency.

At the beginning of the cycle also, plants may need extra liquid fertilizer for a strong start. However, be sure to check nutrient levels first. If the medium has been moistened and stored after the SRF is incorporated, nutrient levels may have already risen to adequate levels — or to levels so high as to require leaching rather than supplemental liquid fertilizer.

As with liquid feed, the rate of SRF should be adjusted according to the level of base nutrient charge in the medium. In media with no base nutrient charge, we recommend adding 4 to 6 pounds of SRF. In media where pre-plant nutrients are incorporated, we recommend adding 2 to 4 pounds of SRF. We tested SRF at a 6-pound rate only, which worked well for petunias and marigolds. However, a 2- to 4-
pound rate would probably be better for impatiens.

Other Important Considerations

First, make sure that the rate of liquid fertilizer application you have calculated is actually what is being applied. Miscalculations and faulty equipment can sabotage an entire crop. Test fertilizer injectors and proportioners with a conductivity meter.

Second, consider your medium's capacity to hold nutrients in reserve. This can have a significant effect on the degree of growth resulting from a given fertilizer application. Adding field soil to a peat-based medium increases nutrient holding capacity and decreases nutrient availability to the plants. In our tests, plants grown in media with 30% field soil were the most similar under our various fertilizer treatments due to this increased nutrient exchange and buffering capacity of the soil component.

Third, media pH also influences the availability of nutrients to the plants. Keep media pH between 5.8 and 6.2 for best results. The careful use of pre-plant incorporated lime will raise pH; injecting acid into the water system will lower pH where alkaline water is a problem.

Monitor the System You Use

Test before you start and test weekly as the crop develops. Use both greenhouse and laboratory testing to antic-

Queen Sophia marigolds four weeks after transplanting into three soil-less media and a 1:1:1 peat, perlite, soil medium (No. 4). Media 1 and 3 had nutrients incorporated and media 2 and 4 did not.
HECO starts with the highest quality brick-cut and brick harvested Canadian sphagnum peat moss. The pH is adjusted. Nutrients, minor elements and special long lasting wetting agents are added in the proper proportions for optimum growth. Uniformity is guaranteed by batch mixing, only 3 bales at one time. HECO can be used straight from the bag. No sterilizing is necessary. Available with or without perlite, HECO saves time in propagation and growing on, actually cuts labor and energy costs. Faster crop turnover and higher quality result in more profit per sq. ft. of greenhouse.

HECO has been on the market since 1969, with a proven record of quality.

Food for thought
Plastics in Agriculture

Super Strength Embossed

Regular Mulches
The Super Strength Embossed formulation provides superb tear resistance and higher barrier retention to methyl bromide. agplast® mulches can easily be laid by machine at higher speeds and easier pullout at the end of the season. Available in Black, White, Clear and White on Black.

Photodegradable Mulches
Same super strength as the Regular Mulch grades but designed to self destruct in a specified number of days. Eliminates costly removal at the end of the season. Also permits machine harvesting of crops without plastic jamming the machine.

For further information contact: Lecofilms
36 Tidemore Avenue
Rexdale, Ontario M9W 5H4
Tel: 416-742-3060

agplast® Check us out! You can't afford not to.

For Your Best Crop

We have reviewed the basic bedding plant fertilization methods here, along with critical factors that help determine optimum rates of fertility. Choose your method or combination of methods based on which will provide the most economical control of growth and flowering with the equipment and labor you have available.

Tomatoes Among Top Selling Bedding Plants

In the 18th annual survey conducted for BPI . . . a growers organization, the international trade association for the bedding and container plant industry, 44% of the respondents named impatiens as their best-seller. Geraniums from cuttings are in a strong second place for 22%.

The top 10 selling bedding plants, according to the survey are: 1) impatiens; 2) geraniums (from cuttings); 3) petunias; 4) Tië: vinca and geraniums (from seed); 6) Tië: begonias, pansies, and marigolds; 9) tomatoes; and 10) Tië: alyssum and lobelia.

Tomatoes' drop from being the third best seller in 1981-82 to ninth place reflects that they, along with other vegetative plants, are not in as high a demand in today's economy.