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Finish Times of Connecticut Bedding Plants

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The finish times of ornamental crops is the result of many interconnected factors. The theoretical optimal finish time is often not reached as weather conditions, insects, diseases, and other factors not within the growers control can influence the rate of plant development. The top growers have highly advanced greenhouses with many automated systems to maximize production. Mid-size and small operations may not rely as much on automation, using hand-watering and less sophisticated chemical application methods.

Connecticut has a robust greenhouse industry, with over $193 million in sales annually1. Bedding plants are an important category and bring in significant revenue for greenhouse operations each spring. Most bedding plants are started from plugs or rooted cuttings and have a rapid turnaround time in the greenhouse. There are many factors that allow for the production of high quality bedding plants that include cultivar selection, fertilizer, temperature, and control of pests and diseases. Growers need to accurately time plantings to meet contract obligations and customer schedules. The data shown below is for finish times of common bedding and garden plants grown in Connecticut.

FACTORS THAT AFFECT FINISHING TIMES

Cultivar. Cultivar selection is based on experience, cost, and availability. Some crops have specific temperature, water, and light requirements for growth and development. These crops have been developed for production at specific times of year.

There are many cultivars of the main bedding plants available. Most seed varieties are F1 hybrids and are typically more expensive than open pollinated varieties. Some crops are available as vegetative cuttings only and may be proprietary. Cultivars that are hybrid should be selected based on their characteristics and productivity in the region. Varieties that are slower growing should be carefully considered before planting on a large scale.

Planting Method and Establishment. Most bedding plants are grown from plugs ready to transplant upon purchase from a specialty plug producer. Some growers grow their own plugs from unrooted cuttings. Direct seeding is occasionally used for difficult to find varieties or based on experience. Workers transplant the plugs directly into flats or pots. In larger greenhouses these steps are automated, with conveyors automatically moving the plant material to the correct area of the greenhouse. Labor and mechanization are looked at as part of the production process. As there are numerous steps where bedding plants are handled, each of these steps can influence the final plant if not

1 NASS, 2024. Accessed online. https://www.nass.usda.gov/Publications/AgCensu s/2022/index.php#full_report

done correctly. Bedding plants are planted densely to maximize space in the greenhouse.

Container size can affect finish time, with larger pots taking longer to fill out. Bedding plants are often produced in flats. The 11 × 21 in. flat, or 1020 flat, is the industry standard, with various insert containers such as 804 and 806 packs, or 12-packs. However, there are many flat and pot sizes, and the selected size may be determined by the requirements of the market or customer. Hanging baskets are very popular, however, require a longer lead time to sales.

Weather. Greenhouses provide significant protection from variations in weather, which is the least controllable factor affecting finish times. Excessive cloud cover and rain can lead to slower growth and increases in certain diseases such as gray mold. Many technologies used in greenhouses are designed to modify the effects of adverse weather.

Temperature. The growing temperature plays an essential role in crop quality and time to finish. Generally, higher temperatures equals faster growth. However, some crops produce the best quality at low temperature ranges. For example snapdragons and pansies are cool temperature crops. Day and nighttime temperatures will influence crop growth and flowering time.

Light. The science of plant lighting continues to advance. Both light intensity and photoperiod influence plant growth. There are many lighting fixtures available for growers that aim to improve flowering or other aspects of plant growth. High pressure sodium lamps, metal halide lamps, LED, and other lighting systems offers unique advantages and provide the plant with specific light wavelengths. Recent advances allow growers to control mols/day of photons.

The material used in covering the greenhouse can influence the amount of available natural light. Structures include glass houses, polycarbonate, and acrylic. Many growers use high tunnels covered by polyethylene plastic film. Shading is accomplished with retractable shade cloth or shade paint. Each structure has specific attributes beneficial in production of certain crops. The material of the structure can have a small impact on finishing times as light can be unevenly distributed if the glass or plastic is dirty and opaque.

PGRs. In addition to modifying temperature and water, plant growth regulating chemicals (PGRs) are used to reduce the height and internodal spread of bedding plants. B-Nine, Bonzi, and Cycocel are some of the most commonly used PGRs and can be applied as a drench or spray. These chemicals are applied at the labeled rate to reduce growth and shorten internodes. Most bedding plants receive two or more applications of PGR during production. A compact growth habit is often most attractive to retail plant buyers.

Disease and Insects. Plant pathogens can cause significant losses in bedding plant production. Some diseases are constantly present in the greenhouse and will infect when conditions are favorable. Botrytis blight is widespread and frequently observed infecting a wide range of bedding plants. Fungicides are necessary to protect plants against this pathogen. Pythium and Phytophthora root rot can cause significant losses if left untreated and spread with splashing water. Leaf spot diseases and powdery mildew are generally less of an issue during bedding plant production than in the landscape. Bacteria are common on seedlings, as they can be seedborne, and spread when conditions are warm and humid during propagation.

Insects that affect bedding plants cause physical damage and can transmit viruses. Thrips, fungus gnats,

whiteflies, aphids, and spider mites are the most frequently observed insect pests of bedding plants. Thrips and aphids are especially problematic due to insecticide resistance and the ability to transmit viruses. Insecticide application, monitoring, and integrated pest management techniques are used to combat these pests. There are relatively few bedding plants with resistance to diseases and insects due to the diversity of available crops.

Media and Fertilizer. Many soil-less media types are available commercially. Most growers no longer use soil in production of bedding and garden plants. Soilless mixes often contain peat moss and are light weight with high water holding capacity. Media that contains Hydrafiber tends to dry unevenly, but is used by some operations as an alternative to peat.

Media pH can have a direct effect on the availability of nutrients. For example, iron and magnesium may become toxic at high media pH but be severely limited at low pH's. Plants grown at an incorrect pH will not respond as well to additional fertilizer as plants grown at the correct pH. Water pH can also have an effect on nutrient availability. The amount and type of fertilizer used is very important to maximize finish times. Even a slight nutritional deficiency can slow down finishing times. Applying excess fertilizer usually will not increase crop growth, or may result in overly vegetative plants with reduced flowering.

Irrigation. Having the correct irrigation schedule is very important in the production of bedding plants. Small and delicate plugs can desiccate if not watered at the correct time on hot days. Watering for bedding plants is usually overhead, based on grower experience and the effect of sunlight, temperature, and cultivar. Modern potting media is porous and overwatering is generally not an issue unless there are long periods of cloudiness and cool temperatures. Well water is preferred over surface water, and large greenhouses usually have precise control over water hardness and pH.

Other cultural factors. The age of planting material can influence the growth of the crop. This is a stage that is often out of the growers control as plugs are purchased from specialized greenhouses. Planting materialthat has received excess PGR or has been held for too long may take longer to develop new roots or grow abnormally.

Postharvest. Postharvest transport and handling is one of the most important stages of crop production and usually the one where major losses can occur. Growers cannot control much of the postharvest process, including handling, conditions on the truck, and watering once plants are at the market. Bedding plants are usually not shipped excessive distances, and are ready for sale as soon as they are transported to market. Extended periods in a humid truck can lead to losses from Botrytis blight and other diseases. The saleable bedding plant should be green, healthy with robust plants, and free from pests and diseases. Flowers are not always required but will increase the likelihood of sales.

Finishing times. The data in Table 1 are based on information from the Connecticut Department of Agriculture, University of Connecticut, and seed companies. If specific crop information for Connecticut was not available, sources from the Northeast US region were consulted. The times listed are for saleable bedding plant packs. Three figures are given for each crop: slow, good, and excellent finish times.

Slow finish times are the slowest times that growers should expect in years with adverse conditions. Growers may not be able to meet contract obligations with these times.

Good finish times are average for experienced growers. Crop culture recommendations are often based on this production level. These finish times should be attainable in most years unless adverse growing conditions cause significant reductions in growth.

Excellent finish times are attained by experience growers growing their crop under optimal conditions. These times are a result of favorable weather, adequate fertilizer, insect and disease control, and the attention to detail of the grower.

Table 1: Finish times for common bedding plants grown in Connecticut. Saleable bedding plants of high quality.

	Finish time (weeks)[1]		
Crop	Slow	Good	Excellent
Ageratum	8	6	5.5
Alyssum[2]	10	9	8
Angelonia	9	8	7
Asparagus fern	26	24	22
Bacopa	10	8	7
Begonia, fibrous	7	6	5
Browallia	11	10	8
Cabbage, ornamental	7	6	5
Calendula[2]	12	11	10
Calibrachoa	9	8	7
Celosia[3]	9	7	6
Coleus	10	9	7
Cosmos	7	6	5.5
Dahlia	11	10	8
Dianthus	12	11	10
Dusty miller	10	9	8
Fuchsia	11	9	8
Gaillardia	12	11	10
Gazania	11	9	8
Geranium, ivy	12	10	9
Geranium, zonal[2]	18	17	16
Gomphrena	8	7	6
Impatiens, bedding	9	8	7
Impatiens, New Guinea	9	7	6
Lobelia	10	8	7.5
Marigold, African	10	7	6
Marigold, French	6	5	4
Nemesia[2]	13	12	11
Nicotiana	8	7	6
Pansy	7.5	6	5
Pepper, ornamental	10	9	8
Petunia	9	8	7
Portulaca	9	7	6
Rudbeckia	9	7	6
Salvia	7	6	5
Scaevola	8	7	6
Snapdragon	7	6	4
Stock	11	9	8
Sunflower[2]	6.5	5	4
Torenia	7	6	5
Verbena	8	6	5
Veronica	13	11	10
Vinca	15	14	13
Zinnia	6	5	4

[1]Finish time from transplant of plug in packs or 4’ pots.
[2]Time from seed.
[3]Cockscomb type.

Table 2: Finish times for common perennial type bedding plants grown in Connecticut.

	Finish time (weeks)[1]		
Crop	Slow	Good	Excellent
Aster	8	6	5
Begonia, tuberous	18	17	16
Butterfly weed	9	8	7
Calendula	10	9	8
Canna[2]	17	15	14
Coreopsis	8	7	6
Cyclamen	25	20	15
Daisy, Marguerite	6	5	4
Dracaena	17	15	14
Gerbera	15	14	13
Heuchera	10	9	8
Ipomea	7	5	4
Lupine	8	5	4
Millet, ornamental	3.5	3	2.5
Osteospermum	10	8	7
Phlox, garden	7.5	6	5
Primula	18	16	15
Scabiosa	10	8	7
Sedum	12	10	9

[1]Finish time from transplant of bulb or liner in 4’ pots.

[2]Time from seed.

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