

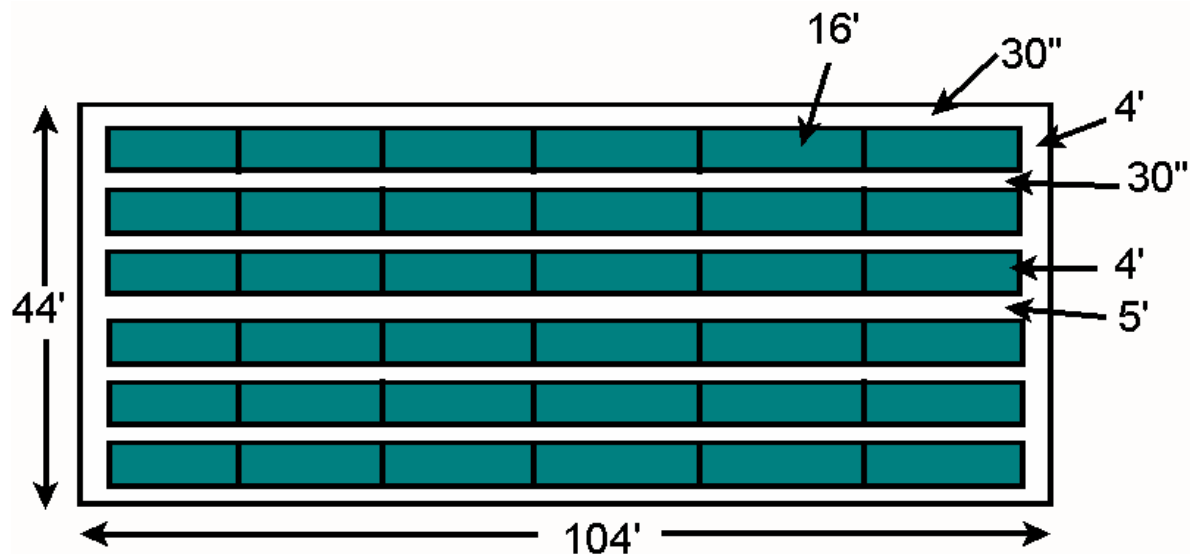
South Dakota State FFA Convention 2007
Floriculture Career Development Event
Problem Test

Problem 1.

You are in the process of designing a new greenhouse for your landscape business. You are planning on using it to grow bedding plants that you will install in your clients' yards. You have decided to use expanded metal benches to grow your plants. They are 4' wide and 16' long. You want to have a 30" aisle between the benches and also between the wall and the outside bench running down the long way in the greenhouse but also have a 5' wide center aisle to facilitate moving plants in and out of the greenhouse. The benches will be placed end-to-end down the length of the greenhouse so that the only aisles will be 4' wide, on the end of the benches, between the bench and the end walls. The greenhouse is 104' long and 44' wide. How many benches will fit in the greenhouse with this configuration? (You may want to try to draw a picture to help figure this out.)

- A. 25 B. 30 C. 36 D. 42

Solution:



Problem 2.

You are planning on doing a mass planting of marigolds for the bed along the front of your school. These will go just great with the blue petunias that will grow in an adjoining bed. You of course want to do a good job and make sure that you grow enough plants, but not too many that you waste money. You did some research and found out that it is a good idea to plant the variety of marigolds that you have at a planting density of 1 every 9 inches with rows that are 9" apart. The bed measures 12' x 42'. You are going to seed your petunias into plug flats that have 288 cells per flat. The seed packet says that the germination rate is 92%. You also expect that 10% of the seedlings that do grow will not survive to the transplant stage. The marigold seed that you want to plant comes in packets that contain 200 seeds each.

How many packets of seeds should you buy to have just enough seed?

- A. 4 B. 6 C. 11 D. 23

Solution:

The bed measures 12 x 42' which gives you 504 sq. ft. of bed space.

Planting in rows 9" apart with 9" spacing between plants will mean that each plant has .56 sq. ft. to grow in. $9 \times 9 = 81$ sq. in. $1 \text{ sq. ft.} = 12 \times 12 = 144$ sq. in. $81/144 = .56$

Next calculate the number of plants needed.

$$504 / .56 = 900$$

Consider germination rate of 92%

$$900 / .92 = 978$$

Finally grow extra plants to account for 10% loss

$$978 / .90 = 1086$$

So you need to plant at least 1086 seeds to have enough plants. Since the seed packets contain 200 seeds, $1086/200 = 5.43$. Which means you will have to buy 6 packets.

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Problem Test

Problem 3.

Situation:

Greater amounts of fertilizer, primarily nitrogen, are applied to greenhouse crops than any other agronomic crop produced. Because all other environmental factors effecting growth are optimized and root medium volume is low, nutrition is maintained at very high levels. One acre of Chrysanthemums will commonly have 4,000 pounds of nitrogen applied to it over a one year period. Much of this nitrogen is not used by the plant and ends up in ground water. New government legislation is now limiting amounts of nitrogen released into the environment. For this reason, greenhouse growers must become more effective at closely monitoring and reducing amounts of nitrogen not taken up by plants.

Fertilizer is applied to greenhouse crops using three main methods:

1. Single applications of granular slow-release fertilizer such as Osmocote
2. Once-per-week applications of soluble fertilizer
3. Fertigation or, applications of a soluble fertilizer with every irrigation

Fertigation is the most common method of applying fertilizer to a crop of bedding plants. This is usually accomplished by using a fertilizer proportioner or injector. A proportioner will take a concentrated fertilizer solution, and precisely mix a small amount of it into the water supply line with the water before it goes into the greenhouse. The most common types of proportioners will mix the fertilizer solution with the water at a rate of 1 part fertilizer to 200 parts water, or a 1:200 proportioner. So, for each gallon of fertilizer concentrate in the supply tank, 200 gallons of properly mixed fertilizer solution will be available in the greenhouse. This way, a grower can automatically fertilize all the plants in a greenhouse without the need to mix up small amounts of fertilizer each time.

Soluble solutions of fertilizer are made up based on ppm, usually of nitrogen.

1 ppm of N equals 1 mg / liter of water from a 100% N source or (1 / 75 oz)/100 gal.

To adjust for the percentage of nitrogen in the powdered fertilizer formulation being used, simply divide by the decimal fraction of the nitrogen percent.

$$\frac{\text{Desired ppm}}{75} = \frac{\text{ounces of fertilizer}}{\text{for 100 gallons of nutrient present}}$$

For example, if you want 200 ppm N from a water soluble fertilizer with 20 percent nitrogen like Peter's 20-20-20, you would use the following equation:

$$\frac{200\text{ppm} / 75}{0.2} = 13.33 \text{ oz} / 100 \text{ gal of water}$$

Problem 3 continued

Using the information provided above, calculate the amount of a 15-16-17 soluble fertilizer (in pounds) needed to fill a 50 gallon fertilizer concentrate tank for use with a 1:200 injector so that the water coming out of the hose inside the greenhouse will have 150 ppm nitrogen.

The correct answer is:

- A. **83.1 pounds**
- B. 1330 pounds
- C. 1250 pounds
- D. 187.5 pounds

Solution:

First calculate what the total, final volume of diluted fertilizer will be.

50 gallon stock tank with a 1:200 proportioner

$$50 \times 200 = 10000 \text{ gallons}$$

Then use the equation to calculate how much fertilizer will be needed.

$$\frac{150/75}{.15} = \frac{2}{.15} = 13.3 \text{ ounces for 100 gallons}$$

Then you only have to do a simple proportion and cross multiply to figure out how much to use for 10000 gallons

$$\frac{13.3}{100 \text{ gal}} = \frac{x}{10000 \text{ gal}} \quad x = \frac{13.3 \times 10000}{100} \quad x = 1330 \text{ ounces}$$

16 ounces = 1 pound

so $1330/16 = 83.1$ pounds of fertilizer in the 50 gallon tank.

South Dakota Floriculture CDE Problem 4 Resources

PanAmericanSeed.

GROWERFACTS

Dragon Wing™ Series Begonia

Not the “typical begonia bedding plant,” **Dragon Wing™** begonia performs exceptionally well in landscapes and garden beds. **Dragon Wing** begonia is more vigorous with a significantly better branching habit than vegetative varieties. These spectacular plants have received rave reviews for outstanding garden performance from California to Florida.

■ This very heat-tolerant, angelwing-type begonia is an excellent specimen plant that is **spectacular in hanging baskets and large containers**.

■ Denser than other angelwing types, 12 to 15-in. (30 to 38-cm) **Dragon Wing** begonias show off **large blooms** that are somewhat pendulous. The large, wing-shaped leaves are solid glossy green.

■ **Dragon Wing** begonias are sold as pelleted seed only. Contact your local distributor or call PanAmerican Seed at 800 231-4868 for ordering information.

Dragon Wing Colors:

Pink ‘DWSA0007’

Red ‘0-1BTC-62A’

B. x hybrida

Approximate seed count (pelleted): 28,500 S./oz. (1,000 S./g)

Germination

Plug Tray Size

Dragon Wing plants are best produced in 200-cell plug trays. This permits the plant enough growth at the plug stage so that the direction of the arching stem is clear for correct orientation at planting time. This orientation can be seen in smaller plugs, but is less readily apparent.

Media

Use a well-drained, disease-free sowing medium with a pH of 5.8 to 6.0 and electrical conductivity (EC) of 0.5 mmhos/cm. A very light covering of vermiculite may be needed when germinating pelleted seed on the bench.

Temperature

72° to 75°F (22° to 24°C). Keep temperature as constant as possible.

Humidity

Maintain relative humidity at approximately 95% or higher.

Light

Light is beneficial but not required for germination.

Plug Production

Temperature

After radicle emergence, maintain a constant 70°F (21°C) soil temperature for two weeks. In Week 3, the temperature can be decreased to 65°F (18°C).

Light

Light will help to ensure a higher-quality seedling. After radicle emergence, keep light levels at 400 to 2,000 f.c. (4,000 to 20,000 Lux) for two weeks.

Fertilizer

Begin fertilization at 5 days out of the germination chamber, or 10 days after germination on the bench. **Dragon Wing** plugs require more feed than other fibrous begonias. Recommended application is 50 ppm N, 2 to 3 times per week. In Week 3, increase feed to 150 to 200 ppm N, 2 to 3 times per week.

Plant Growth Regulators

Growth regulators are not required to produce **Dragon Wing** begonia plugs.

Growing On to Finish

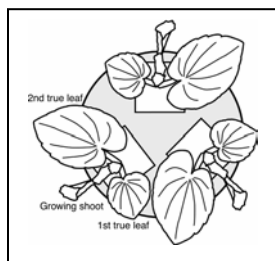
Container Size

Dragon Wing begonias can be transplanted into a wide range of container sizes. Follow these guidelines for the number of plants per pot or basket:

Container Size	Bench Spacing	Plants Per Pot/Basket
4-4.5-in. (10-11-cm)	Pot-tight	1
5.5-6-in. (14-15-cm) pots	8 in. (20 cm)	1-2
6.5-8-in. (16-20-cm) pots	8-10 in. (20-25 cm)	2-3
1-gal. container	10 in. (25 cm)	2
10-12-in. (25-30-cm) baskets	—	4

Transplanting

Due to directional stem properly when placing Plugs must be placed the container (see directional growth the outside of the finish



*arching, it is very important to position **Dragon Wing** plugs more than one plug into baskets and containers for finishing, with the growing shoot facing outward, toward the outside of drawing).* This is the side of the plant the flower is on. The remains consistent as the plant matures, ensuring flowers on container.

Media

Use a well-drained, disease-free, soilless medium with a pH of 5.4 to 6.0 and electrical conductivity (EC) of 1.0 mmhos/cm.

Light

Grow on in a high-light environment – 3,000 to 7,000 f.c. (30,000 to 70,000 Lux). *Daylength and light quality can have a dramatic effect on plant habit; daylength can also affect flowering time.* **Dragon Wing** begonias will flower under natural daylength year-round, making them a good choice for year-round production in warmer climates. They flower 1 to 3 weeks faster under short days. Short days (8 to 10 hours) cause plants to grow nearly horizontal. Natural or HID long days give intermediate, arching growth. Long days provided by incandescent lighting cause more upright growth, which is beneficial for plant shipment (tighter spacing on shelves with less breakage).

Watering

Produce **Dragon Wing** begonias on the drier side to help prevent any fungal or water mold-type diseases. However, allowing plants to wilt even slightly between waterings will delay flowering, reduce branch number and result in pale foliage.

Fertilizer

A feed program of 200 ppm N once a week can begin as soon as the plugs have begun to root out.
NOTE: Severe fertility and/or water stress will delay flowering 1 to 2 weeks.

Crop Scheduling

Sow to transplant: 7 to 8 weeks

Transplant to finish:

4-in. (10-cm) pots with 1 plant per pot: 7 to 9 weeks

6-in. (15-cm) pots with 2 to 3 plants per pot: 7 to 9 weeks

8-in. (20-cm) pots with 3 plants per pot: 8 to 10 weeks

10-12-in. (25-30-cm) pots with 4 plants per pot: 9 to 11 weeks

Common Problems

Dragon Wing begonias are quite disease and pest-free. No major problems will occur if using good cultural and IPM practices. A wide range of insecticides have been tested on **Dragon Wing** plants with little or no phytotoxicity.

In the Garden and the Landscape

Home gardeners and landscapers will see the best results when they plant **Dragon Wing** begonias in a well-drained location with partial shade or filtered sun. Feed regularly with an all-purpose fertilizer. If the foliage turns a bronze (reddish) color, more feed is required. In landscapes and gardens, place **Dragon Wing** plants on 10 to 12-in. (25 to 30-cm) centers. **Dragon Wing** begonias will reach a height of 12 to 15 in. (30 to 38 cm) and spread to about 15 to 18 in. (38 to 45 cm) in the garden.

Problem 4.

You are the grower in a local greenhouse. Your production manager has heard about these great new plants, called Dragon Wing Begonias. She has suggested that you grow these new begonias this year. She has suggested that you produce 1400 - 4.5" pots and also 500 - 10" hanging baskets. Your spring open house is on May 15 and she wants you to have the crop ready to sell for that date. Using the information provided in the "GrowerFacts" provided by Pan American Seed, which of the following statements would be your best course of action to have this crop ready to sell on May 15?

- a. You need to order 1 ounce of seed, and plant the crop in 512 cell plug flats. Seed should be sown 22 weeks before the open house on May 15.
- b. You need to order ½ ounce of seed and plant the crop in 512 cell plug flats. Seed should be sown 8 to 10 weeks before the open house on May 15.
- c. You need to order ¼ ounce of seed and plant the crop in 200 cell plug flats. Seed should be sown 7 to 9 weeks before the open house on May 15.
- d. **You need to order 1/8 ounce of seed and plant the crop in 200 cell plug flats. Seed should be sown 17 to 19 weeks before the open house on May 15.**

Solution:

First calculate how many plants will be needed. Each 4.5" pot will need one seedling per pot. The 10" baskets need 4 plants per basket for a total of 3400 plants. There are 28,500 seeds per ounce. If you buy 1/8 ounce, this should provide about 3562 seeds, which will allow for a few extra seeds.

The growing information suggests that they are best grown in a 200-cell plug tray. Production time from seeding to transplant is normally 7-8 weeks.

Production time from transplant to finish in 4" pots is an additional 7-9 weeks and 9 to 11 weeks in a 10" hanging basket with four plants. So total cropping time will be about 17 to 19 weeks. Therefore, the best answer is D.

Floriculture Career Development Event

Problem 5 Resources

Drought Tolerant Prairie Plants of South Dakota

by Nicole Hill

Achillea millefolium

Common yarrow

Family: Asteraceae

Growth Habit: Forb/herb

Duration: Perennial

Sun exposure: Full sun

Bloom time: Throughout summer

Nativity to South Dakota: Non-native



Common Yarrow is an old-fashioned perennial with gray-green fine textured foliage and flat-topped flowers. Flowers vary in color and include yellow, white, and pink. It grows anywhere from one to two feet tall and makes a good background or border. Yarrow make excellent cut and dried flowers, but often need dividing every three years. The plant is also known for some medicinal uses and has been recommended as a cure for sores, toothaches, diseases of the lungs, bladder, and kidneys, a local anesthetic, a stomach and nerve tonic, an ingredient in salads and soups, and a tobacco substitute. Yarrow can be planted by seed or transplant in the spring or fall.

Echinacea angustifolia

Purple coneflower

Family: Asteraceae

Growth Habit: Forb/herb

Duration: Perennial

Sun exposure: Full sun

Bloom time: July to frost

Nativity to South Dakota: Native



Purple coneflower is a long blooming perennial that thrives in hot, dry locations and does well in poor soils. This plant grows two feet tall with a coarse, bristly-haired stems and flowers that have purple rays surrounding an orange cone-like disc. It makes a good accent to any garden and establishes itself quickly but may become invasive. It is valued as a cut and dried flower. A valuable herb may also be extracted from the root which is believed to help the immune system. Native Americans also chewed the ground roots and swallowed the juice to alleviate coughs and sore throats. This plant can be sown by seed or transplanted in the spring.

Opuntia humifusa

Prickly Pear Cactus

Family: Cactaceae

Growth Habit: Shrub/sub shrub

Duration: Perennial

Sun exposure: Full sun

Bloom time: Mid-summer

Nativity to South Dakota: Native



Prickly Pear Cactus grows wild on South Dakota prairies usually west of the Missouri River. This plant grows in very poor soils and prospers in areas that are heavily grazed. It is a flat cactus type and has one inch long spikes. Flowers of yellow to peach are produced and followed by a red fruit. It tends to creep and can make an interesting addition to a rock garden, but the spikes can be painful so place in an area with little traffic passing directly by it. It can be transplanted in the spring or fall.

Panicum virgatum

Switchgrass

Family: Poaceae

Growth Habit: Graminoid

Duration: Perennial

Sun exposure: Full sun

Bloom time: Fall

Nativity to South Dakota: Native



Switchgrass is a tall grass native to South Dakota's prairies. It grows four to five feet tall and spreads three to four feet. The plant has a fine textured panicle seed head giving a rather delicate look to the plant. Switchgrass makes an excellent background or mass and adds winter interest to any garden. Many cultivars are available, including ones that have a deep red fall color. It can be sown from seed or transplanted as well.

Pulsatilla patens

Pasque flower

Family: Ranunculaceae

Growth Habit: Forb/herb

Duration: Perennial

Sun exposure: Full sun/Part shade

Bloom time: April

Nativity to South Dakota: Native



Pasque flower, South Dakota's state flower, is often one of the first plants to bloom in the spring. It grows about eight inches tall and has several stems. In spring, the plant is insulated with fine silky hairs and blooms just when the leaves are starting to develop. One flower, consisting of dark lavender to nearly white petals and yellow stamens, forms at the top of each stem. It can be grown in full sun to part shade and prefers well drained sites. Pasque flowers bloom first on hillsides in heavily grazed or fall-burned native prairies. The lack of old, dead plant material on these sites allows the soil to warm rapidly so this plant can get an early start. Pasque flowers dried at flowering time were formerly used medicinally in many parts of the world.

Ratibida columnifera

Prairie coneflower

Family: Asteraceae

Growth Habit: Forb/herb

Duration: Perennial

Sun exposure: Full sun

Bloom time: Mid-summer

Nativity to South Dakota: Native



Prairie coneflower is a common plant seen growing wild on the prairies. It grows about a foot and a half tall and has flowers consisting of an elongated purplish-brown cone surrounded by drooping yellow petals. The foliage of this plant is fine textured with the top one-third of the stem bare except for the flower heads. In our area, prairie coneflower thrives on heavily and moderately grazed pastures, but it can also be growth as a short-lived ornamental. Some Native Americans used this plant to make remedies for snakebites and poison ivy and also used it to make teas.

Rudbeckia hirta

Black-eyed Susan

Family: Asteraceae

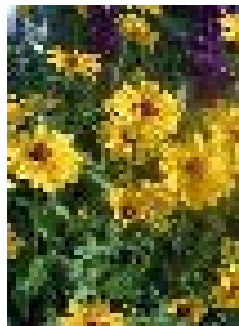
Growth Habit: Forb/herb

Duration: Annual

Sun exposure: Full sun

Bloom time: Mid-June to frost

Nativity to South Dakota: Native



Black-eyed Susan is a plant that tolerates heat and drought and grows one to three feet tall. The stems are rough and hairy, topped by a flower consisting of long gold ray florettes surrounding a dark brown cone-like center. With its long bloom time, it also can be used as an accent in any garden. It is also valuable as a cut flower. This plant can be started by seeds or transplants in early spring.

Schizachyrium scoparium

Little bluestem

Family: Poaceae

Growth Habit: Graminoid

Duration: Perennial

Sun exposure: Full sun

Bloom time: Fall

Nativity to South Dakota: Native



Little bluestem is a tall grass native to South Dakota. It reaches a height of three to four feet and spreads one to two feet. This plant is a late blooming plant that persists well into the fall with blades that turn red to purple in the fall. The seed head consists of elongated spikes that also persist and turn purple in the fall. This plant makes a good background or mass. It can be planted by seed or transplant in the spring.

Sorghastrum nutans

Indian grass

Family: Poaceae

Growth Habit: Graminoid

Duration: Perennial

Sun exposure: Full sun

Bloom time: Fall

Nativity to South Dakota: Native



Indiangrass is another tall grass native to South Dakota prairies. It grows four to five feet tall with bluish blades and has large, soft plumes with glossy bronze seed heads in the fall. Indian grass thrives in dry conditions, and although it is a bunchgrass, it can be rather aggressive. This plant makes a good background, mass, or screen and also adds winter interest with its persistent seed heads. It can be planted by seeds or transplants in the spring or fall.

Yucca glauca

Soapweed yucca

Family: Agavaceae

Growth Habit: Sub shrub, Shrub,

Duration: Perennial

Sun exposure: Full sun

Bloom time: Mid-summer

Nativity to South Dakota: Native



Forb/herb

Yucca, found mostly west of the Missouri River, thrives in hot, dry locations. It has sharp-tipped, fibrous leaves up to two feet long. Ten to fifteen greenish-white flowers form on a spike that reaches up to three feet tall. Once mature, these large flower capsules enclose black seeds. Yucca is seen growing native on dry, gravelly slopes and in the Badlands. After flowering, the main plant will die and produce offsets from the base. American Indians used yucca roots for making soap and hair tonic; central spikes, flowers, and seed pods were eaten, and the spiny leaf tips, often with the fibers still attached, served as ready-made needles and threads.

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Floriculture Career Development Event

Problem 5

This was an outreach publication, *Drought Tolerant Prairie Plants of South Dakota*, prepared by a student in a Herbaceous Plants class at SDSU. Examine the publication then decide which of the following statements is most correct.

- A. **There are many drought tolerant plants that can be used in the landscape. Yucca, Purple Coneflower, Pasque Flower and Indian grass are all examples of native plants that can be used in the landscape.**
- B. Only native plants will truly be drought tolerant in our South Dakota prairie landscapes. Furthermore, many of our native plants are also edible and may have been used for various medicinal properties.
- C. Purple coneflower, the state flower of South Dakota, is a good example of a native, drought tolerant plant. Native Americans also chewed the ground roots and swallowed the juice to alleviate coughs and sore throats.
- D. Indian grass, switch grass and little bluestem are examples of native grasses that are very tolerant of drought but should be grown in a partially shaded location for best growth.

Solution:

All of the statements in choice A are correct, according to the publication.

Choice B is not correct because there are plants that are not native to South Dakota that may be as drought tolerant as our native plants.

Choice C is incorrect because Purple Coneflower is not our state flower.

Choice D is incorrect because the grasses listed should be grown in full sun, not a shaded location.