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A Grower's Guide to Producing Woody Floral Stems

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What Are Woody Florals?

Any woody species with a colorful or unusually shaped stem, bud, flower, fruit or bark can produce a decorative woody floral product. Floral designers use these products to enhance arrangements and profit margins by adding interesting color, texture or form and increasing width and height.

Fresh floral design with trellis made from yellow dogwood stems.

Forsythia branches in bloom

Plants that produce woody floral products include species such as curly or corkscrew willow, Scarlet Curls® willow, fantail willow, pussy willow, red and yellowtwig dogwood and red (sweet) birch. Holly is valued for its evergreen leaves (in some species) and bright red berries. Witch hazel, redbud, quince, forsythia, apple, cherry and plum, among others, are prized for their forced flowers.

Woody Floral Markets

There are good opportunities in the Midwest to produce and market decorative stems for substantial financial returns. For example, wholesale prices (the price paid to a producer by a floral wholesaler) of pussy willow or curly willow stems (3 to 5 feet long) generally run around $0.37-$0.45 per stem (respectively), with larger stems bringing more (Table 1). Flowering branches have similar markets and command higher prices per stem. Fresh stems are sold to retail floral shops, wholesale distributors, directly to consumers at farmers markets and craft shows and for potted window displays used in commercial establishments, urban landscaping and other high-end locations. Extensive markets also exist for dried woody floral stems, particularly curly willow, pussy willow and dogwoods.

Floral greens are cut branches from coniferous trees, such as firs, spruces and pines, for use in wreathes and seasonal decorations. They are harvested from native forests, particularly in Minnesota and Wisconsin and from Christmas tree farms across the Midwest. The floral green industry in Minnesota alone generates $33 million per year in revenues.

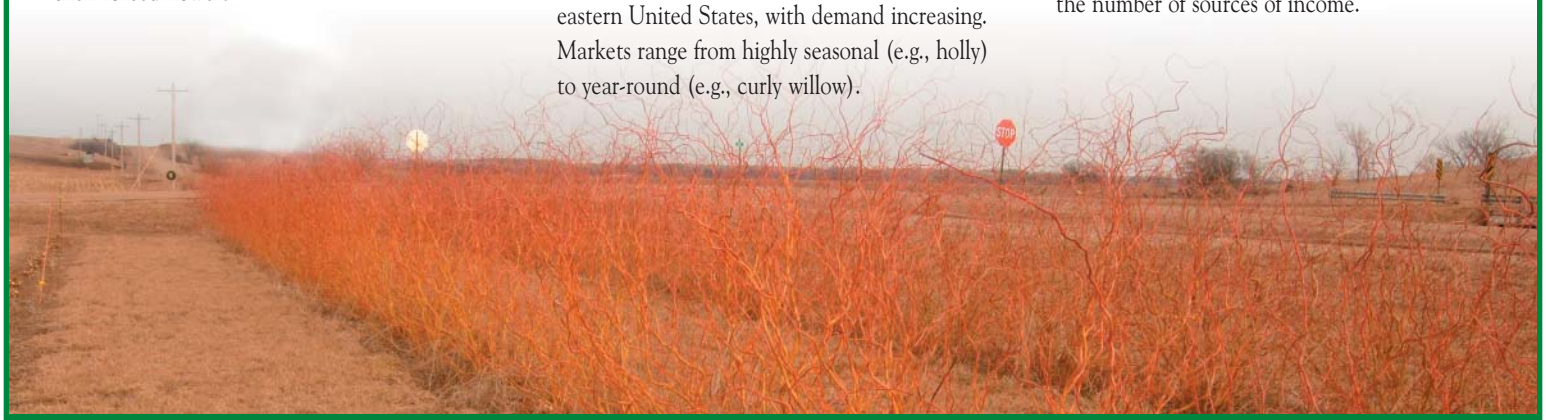
Fresh woody florals conservatively comprise at least an $8 million market in the central and eastern United States, with demand increasing. Markets range from highly seasonal (e.g., holly) to year-round (e.g., curly willow).

Woody Florals as a 'Third Crop'

Plants that produce woody floral products can be a profitable component of diverse agricultural systems because of their substantial markets, rapid growth, relatively quick returns, low capital costs and off-season labor requirements. Woody florals can be integrated into conventional farming systems, for example, by using marginal lands not well-suited to row crops. They provide a win-win for the producer by producing profitable low-input crops, while protecting and enhancing the environment.

Conservation plantings, such as riparian buffers and windbreaks, are good locations for profitable woody floral production. While possible, it is challenging to incorporate woody floral production into alley cropping systems due to the risk of damage from herbicide drift and farming activities.

While not likely to be a primary source of income, these commercially valuable specialty products can provide supplemental income. Depending on the number of plants and cultivars placed into production, woody floral operations can yield gross returns of thousands of dollars per acre (utilizing 2005 yield data). Diversification with woody florals as a 'third crop' also reduces financial risk by increasing the number of sources of income.



Scarlet Curls® willow stem color

How to Grow Woody Florals

Site Selection and Planting Design

Most shrubs that produce woody florals are adapted to moist areas along bodies of water. While they will grow well with adequate moisture on a wide range of soils, woody floral plantings on sandy soils generally have lower plant survival, poorer growth rates and lower quality stems without irrigation.

To ease harvest, the same species or cultivar should be planted together in rows. Most species should be spaced approximately 4 feet apart within the row. Larger, faster-growing species, such as Scarlet Curls® and pussy willow, should be spaced 6 feet apart within the row. Between-row spacing depends on equipment access required and can range from 6-15 feet, with 12 feet being common. To maximize production per unit area and allow for equipment access, some systems use two closely spaced rows (4-6 feet apart) separated by a wider spacing (12-15 feet between rows).

Some plantings can be combined with government conservation programs, with planting designs determined by the program's standards and requirements. Note that harvesting and selling woody crops produced on land under contract in federal conservation programs, such as Conservation Reserve Program, Conservation Reserve Enhancement Program or others, may not be permitted. One option for avoiding legal conflicts is to plant additional rows of harvestable woody crops just outside the area under contract. You can also establish woody floral plantations using federal- or state-funded cost-share programs that do not restrict woody crop harvest.

Species Selection and Plant Sources

Many commonly available species of trees and shrubs produce commercially valuable woody florals. Other more obscure plants or cultivar selections also produce interesting products with commercial promise but may not be in demand due to lack of knowledge about the product by florists or consumers. It is best to establish a foundation planting of cultivars well known in the industry by planting a variety of marketable cultivars to reduce production and market risks.

While larger, more expensive nursery stock can be used for establishment, smaller (approximately 1 foot tall), cheaper shrub liner stock is available from commercial nurseries. Very small plants may need to be potted and grown for a year before being planted in the field to increase survival.

Wholesale and retail plant material suppliers and prices can be found on the Nebraska Forest Service's specialty forest products web page, located at http://www.nfs.unl.edu/specialtyforestproducts.asp.

Site Preparation

When converting pasture for woody crop production, it is important to eliminate all indigenous plant material (with the exception of bluegrass) in the area to be planted. Using herbicides to eradicate unwanted plant material without disturbing the soil will help minimize broadleaf weed invasion before and after planting the shrubs.

Smooth brome grass pastures integrated with woody florals will need to be carefully maintained to prevent re-invasion of grass in woody plant rows. It is generally recommended that areas in which you will plant woody florals are free of brome grass. If you wish to plant grass between specialty forest product rows, bluegrass is preferable.

Mechanically disking rows will break up the soil but will also create subsequent herbaceous weed problems. However, compacted soils, as well as plantings near or within existing windbreaks and riparian buffer strips, will most often need to be tilled, deep ripped and/or plowed and disked to loosen the soil before planting.

Plant woody florals at the same depth they grew in the nursery bed. Make the planting hole large enough to receive the entire root system without crowding or bending. A shallow hole may cause the roots to be turned up at the bottom, resulting in root deformities, reduced vigor and/or death. Planting too deeply will permanently stress the plant, also reducing productivity and vigor. Pack soil firmly around roots and lightly tamp to remove all air pockets.

Caring for Woody Floral Shrubs

Irrigation

Drought-induced tip burn or dieback can result in unmarketable stems and financial loss. Thus, overhead or drip irrigation is needed in drier areas and when plants are established on sandy soils. A number of woody florals with commercial markets, such as willows and dogwoods, are adapted to moist sites and will require supplemental irrigation in Nebraska and much of the Great Plains where drought frequently occurs during the growing season.

What Are Woody Florals?

Any woody species with a colorful or unusually shaped stem, bud, flower, fruit or bark can produce a decorative woody floral product.

Frequent moisture on foliage can foster foliar and stem diseases, so care must be taken with overhead irrigation. Drip systems, which avoid this problem and use less water, are preferred. Continuous fabric mulch can also be used to help retain soil moisture and reduce weed competition. It is important not to irrigate too late in the growing season, as the plant needs ample time to harden off for the winter months. Too much moisture late in the growing season encourages a flush of soft tissue growth, which is not desirable after August.

Sun Exposure

Many shrub species that produce woody floral stems are native to open riparian areas and not to true woodlands. While most require full sun for maximum production, a few woody floral species will tolerate some shade, particularly witch hazel and hydrangea. Shade-tolerant species can be grown under managed forests or shade cloth.

Weed management

Grass and herbaceous weed competition must be managed to maximize growth of woody floral shrubs. Continuous fabric mulch is effective in controlling weeds. However, as plant crowns expand with an increasing number of stems, fabric will need to be cut away from the base of the plants to prevent stem girdling. Wood chip mulch combined with herbicide applications effectively reduce weed competition and help conserve moisture. Maintain a 2- to 3-foot-wide weed-free swath on each side of planted rows to eliminate weed competition. Cool season grasses can be planted between rows, as they are dormant in the summer and do not compete with woody crops for nutrients or moisture. Weed and grass problems can be significantly reduced by applying a pre-emergent herbicide, followed by applications of contact herbicides, such as glyphosate. Care must be taken as contact herbicides can damage or kill woody shrubs. As with all chemicals, be sure to read the label thoroughly before application, especially when the pesticide will be used near water.

Fertilization

Accurate soil tests are an important tool for determining soil nutrient levels and adjusting soil fertility as necessary to enhance woody floral growth, quality and returns. Woody floral crops may grow taller and be more vigorous at optimal soil fertility. Dogwood species can add 1 to 2 feet of additional growth per year, reaching a harvestable 4 to 5 feet in one growing season if fertilized. The increased productivity may enable producers without irrigation to harvest dogwood every year instead of every other year, significantly increasing profits. It is important to remember that the type and amount of fertilizer applied should be based on each site's soil. Depending on the results of soil tests, each site may require different nutrients and/or application rates.

Fertilization needs to be combined with irrigation to maximize growth. As with irrigation, it is critical to fertilize only in the early part of the growing season so that soft tissue growth is minimal by September, and the plant is allowed to acclimate to winter conditions.

Pest and Diseases

A number of insect pests, including grasshoppers, dogwood stem borers and leaf defoliators, have occasionally reduced stem height and quality in Nebraska plantings. Larvae of the red-spotted purple butterfly and the smartweed caterpillar may cause minor defoliation. A number of other insects, including scale, spittle bugs, Cecropia moth caterpillars, aphids and spider mites, are all common pests of dogwood and willow plants. These pests can be controlled with appropriate pesticides when damage exceeds acceptable levels.

Dogwood and willow branches can be affected by a stem canker disease, which may cause portions of the stem to turn black, resulting in the loss of marketable stems. This disease has been effectively managed by harvesting the plants to the ground each year and removing all diseased stems from the site. Both dogwoods and willows are also susceptible to leaf spot. This disease does not damage the stems and is mostly an aesthetic concern. However, plants with severe leaf spot may suffer heavy defoliation, weakening the plant and reducing stem number and height.

Wildlife Damage Management

Rabbits and rodents can cause damage to plants, especially during establishment. Populations of these animals tend to be higher in grassy areas, such as pasture. Decreasing available cover by frequent mowing between woody floral rows will usually reduce damage by rabbits and rodents. Physical removal of rabbits by trapping and hunting can also reduce damage. Fencing, though costly, may be warranted in severe situations.

Deer rub on curly willow stems

Harvesting woody stems in late winter or early spring may allow white-tailed deer to have unlimited access to plants during most of the winter, resulting in high levels of browse and rub damage. Deer browse damage can be especially severe on dogwood cultivars, resulting in losses of 50 percent or more of the stems. Browse damage can be minimized by harvesting the most susceptible species in November and December before cumulative deer browse damage reaches severe levels.

Dogwoods left to grow one year after being browsed produce more highly branched stems, which may affect market value or salability to some florists. Goldencurl and corkscrew willow, both upright cultivars, can experience severe rubbing damage by deer during the winter season.

Several willow cultivars (Scarlet Curls®, curly and Flame) have experienced little browse damage in Nebraska field trials. Planting these less-preferred species can help reduce deer damage.

Redtwig dogwood in windbreak planting

Climate and Weather Impacts

Weather extremes, such as hail storms and early fall or late spring freezes, can inflict severe damage on a woody floral crop. Because of the high quality requirements for woody floral products, what may seem to be minor tip damage may render an entire stem unmarketable. Woody florals must gradually acclimate to freezing temperatures. Severe stem damage has resulted on some species in Nebraska when fall weather remains frost-free or relatively warm with light frost followed by a hard freeze. Severe drought will also reduce quality and yield, even with irrigation, and may make plants more susceptible to insect and disease attacks. Protection from wind will also increase stem length and quality.

Harvesting Woody Florals

Producing woody florals requires relatively intense labor inputs during plantation establishment (spring) and when harvesting, processing and marketing (fall/winter). Weed control and mowing will be required during the growing season. Harvesting normally occurs after agricultural producers have harvested their conventional crops, reducing on-farm labor conflicts.

Harvest Procedures

Before their first harvest, woody florals should be grown for at least two seasons when planting large nursery stock and possibly three seasons if planting smaller stock. This allows shrubs to establish a healthy root system. This initial establishment period will also depend on soil texture and fertility, irrigation, weed control and animal management, all of which affect overall growth rates. Once the plants are established, most species that produce woody floral stems generally grow tall enough to permit annual harvest given adequate soil fertility and moisture.

Most commercial operations harvest by hand with loppers. Mechanical methods can be devised; however, stems still need to be pruned and bundled manually. Several commercial growers only cut marketable stems, reducing subsequent grading activities. This may be an appropriate practice for slower growing plants, such as holly or witch hazel, since a considerable number of stems of these species are only 2 to 3 feet tall after one year's growth without irrigation. Cutting the entire plant would result in having to discard a large portion of short stems (less than 3 feet) as being unmarketable, significantly reducing current and potential financial returns.

Cutting all stems may be an appropriate management practice for faster growing species (Scarlet Curls®, curly, Flame and pussy willow and irrigated dogwoods) for which most stems per plant grow 4 to 5 feet tall, or more, in one year, thus producing higher numbers of marketable stems.

Processing Stems

Harvested stems are processed to meet buyers' quality criteria, so this is the most labor-intense stage in a woody floral enterprise. Criteria include: quantity, length ("tips," "mediums" and "longs," with the length of each varying by buyer requirements for each species or cultivar) and condition (color and lack of defects, such as browse damage, dead tips, scarred stems and excessive branching).

Stem quality is of key importance with woody florals sold to the fresh and dried floral industries. Stems must be alive (for fresh florals), flexible, of full color, have no broken or dead tips and lack insect and/or animal damage.

Processed stems are then bundled by quantity, length and variety and either shipped or stored. A 'bundle" consists of between 5-20 stems gathered and tied together with string or rubber bands. For example, stems that are 5 feet or longer are typically bundled in fives, and stems that are 3 to 5 feet long are typically bundled in tens.

A "bunch" is a number of bundles gathered together. The number of bundles per bunch varies according to buyer and stem size requirements.

Post-Harvest Storage and Care

Harvested woody floral stems should be stored in clean water or a 10 percent water: bleach solution at 34-40° F. A dark cooler is optimal for retaining quality and longevity; however, stems can be stored for up to three to four months (until early spring) in a barn or garage under ambient winter conditions in the upper Midwest and Great Plains. Water levels should be monitored and maintained at an adequate level.

Hauling harvested woody floral stems

The length of time woody floral stems can be viably stored is determined by evaluating stem color intensity, flexibility, tip die-back and shoot and root growth. After several months of storage in a cooler, stems may appear to retain high quality, but will quickly degrade once placed in ambient conditions.

Woody floral stems in storage buckets

Expected Yields

Most woody floral shrubs respond well to being cut to the ground each winter, producing high numbers of 2 to 8 feet tall stems the following growing season, depending on species and growing conditions (Table 2).

Many species of woody florals have shown little to no decline in vigor in Nebraska field trials after five harvests (removing all stems to within 4 inches of the ground). (Table 2)

Scarlet Curls® and pussy willow produce prolific numbers of stems after the second harvest. Scarlet Curls® and pussy willow are the most vigorous and tallest (7 feet per year) woody florals tested in Nebraska.

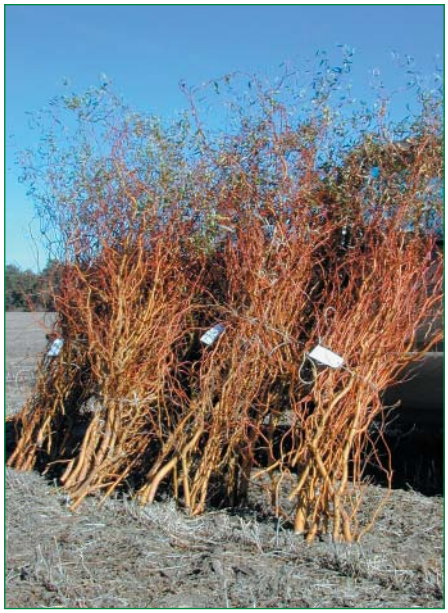
Yields of marketable stems increase, often substantially, between the first and second year. This is largely due to extensive coppicing of shrubs after the first cutting. Yields continue to increase annually with dogwoods, approaching 40 marketable stems per plant after six harvests. Pussy willow stem production also increases over time, while Scarlet Curls® willow levels off after the third harvest.

Costs and Returns

Capital costs in a woody floral business can be much lower than other "alternative" agricultural enterprises, which removes a critical barrier to entry. Establishment costs over two years generally range between $529 and $1,114 per 1,000 linear feet of planting depending on the site's condition and the size and species of nursery stock planted (Table 3). These costs include site preparation (tillage), three herbicide applications/year for weed control, plant material costs (for small 8-12 inch tall nursery liner stock), and planting costs (including replacing an estimated 20 percent mortality in the second year). Annual weed control costs in subsequent years total approximately $40 per 1,000 linear feet. Contact your local Natural Resource District (NRD) for the latest establishment and maintenance costs for your area.

On-farm family labor for smaller operations is often available since these perennial woody crops are harvested during the winter. With a larger operation however, high labor requirements during a narrow time period (usually mid-November through March) and limited rural labor availability may dictate the size of the enterprise and acres planted. These may be significant advantages to small-scale enterprises scattered across Nebraska. Combining production among many small producers reduces individual production and weather-related risks. This ensures a more consistent supply, allows for larger quantities of stems to be marketed in major markets and helps secure forward contracts with wholesalers, reducing market risk.

Gross financial returns from integrated plantings using woody florals in alley cropping systems can be substantial (Table 4). Many woody florals can be produced in the Midwest, and some cultivars can generate gross incomes ranging from $8,843to $16,308 per acre, per year (utilizing 2005 yield data) beginning two to three years after planting, depending on species and spacing. Net income will depend on operational efficiency and cost management.



Scarlet Curls® willow yield of five plants harvested

Table 1. Prices paid by Nebraska wholesale florists for woody floral stems, by stem size and species or cultivar.

Stem size	Scarlet Curls® willow	Curly willow	Flame willow	Pussy willow	Yellowtwig dogwood	Bailey dogwood	Colorado dogwood	Cardinal dogwood
Tips: 1.5-3 ft. (0.45-0.9m)	0.20	0.20	0.20	0.25	0.00	0.00	0.00	0.00
Medium: 3-5 ft. (0.9-1.5 m)	0.45	0.45	0.40	0.40	0.40	0.40	0.40	0.37
Long: >5 ft. (1.5 m)	1.20	1.20		0.55	0.55	0.55	0.55	0.55

Table 2. Average number of marketable woody floral stems harvested at Mead (Ithaca) Nebraska research site. Harvest years 1 through 6

	avg. # marketable stems/plant 1st Harvest[a]	avg. # marketable stems/plant 2nd Harvest[b]	avg. # marketable stems/plant 3rd Harvest[c]	avg. # marketable stems/plant 4th Harvest	avg. # marketable stems/plant 5th Harvest	avg. # marketable stems/plant 6th Harvest
Growing Year	2000	2001	2002	2003	2004	2005
Species						
Scarlet Curls Willow	22	53	28	22	14	29
Corkscrew Willow	0	14	15	21	17	39
Pussy Willow	13	43	7	62	35	53
Bailey Dogwood	6	9	10	49	44	40
Colorado Dogwood	8	9	13	51	25	38
Cardinal Dogwood	9	8	15	22	21	30
Flame Willow	0	10	14	0	6	31
Yellowtwig Dogwood	2	4	6	18	28	33

a. 2nd year's growth after planting large nursery stock on a 5ft (1.5m) spacing within the row.
b. 1 year's growth after harvest.
c. Drought year.

Table 3. Costs to establish and maintain 1,000 linear ft. (304.8m) of woody floral-producing plants.

Cost item	Unit cost	Total cost at 6-ft (1.8 m) spacing[a]	Total cost at 4-ft (1.2 m) spacing[b]
Year 1 costs (establishment year)			
Site preparation per linear ft (0.30 m)	$0.05	$50	$50
Planting costs per plant	$0.30	$50	$75
Plant material costs per plant[c]	$1.40–$3.70	$223–$617	$233–$687
Weed control: Three herbicide applications/year at $0.02/ft ($0.66 m)	$0.02	$60	$60
YEAR 1 TOTAL COST		**$410–$794**	**$443–$897**
Year 2 costs			
20% mortality replacement (plant material + planting cost)		$59.40–$135.20	$90–$157.50
Weed control: Three herbicide applications/year at $0.02/ft ($0.66 m)	$0.02	$60	$60
YEAR 2 TOTAL COST		**$119.40–$195.20**	**$150–$217.50**
TOTAL ESTABLISHMENT COSTS YEARS 1 and 2		**$529.40–$989.20**	**$593–$1114.50**
Year 3 and after			
Weed control: Three herbicide applications/year at $0.02/ft ($0.66 m)	$0.02	$60	$60

a. 167 plants/1,000 linear ft (0.55 plants/m)
b. 250 plants/1,000 linear ft (0.82 plants/m)

c. Establishment costs from the 2004 Natural Resources District (NRD) Tree Program Survey. Plant material costs range from $1.40/plant for a 12- to 18-inch Flame willow to $3.70/plant for an 18- to 24-inch Scarlet Curls® willow.

Table 4. Woody floral processing and marketing labor requirements and costs, including estimated financial returns per plant. Based on the average of 2004 & 2005 (5th & 6th harvests).

Labor time, costs and financial returns	Scarlet Curls® willow	Flame willow	Pussy willow	Curly willow	Yellowtwig dogwood	Bailey dogwood	Colorado dogwood	Cardinal dogwood
Harvest time (average hours/plant)	0.13	0.08	0.13	0.1	0.05	0.08	0.08	0.04
Grading & bundling time (average hours/plant)	0.71	0.16	0.32	0.36	0.19	0.15	0.21	0.18
Average marketing time (hours/plant)	0.16	0.01	0.15	0.04	0.09	0.04	0.05	0.02
Average processing & marketing time (hours/plant)	**1.00**	**0.25**	**0.61**	**0.50**	**0.34**	**0.26**	**0.34**	**0.24**
Total labor cost/plant at $7/hour	$7.02	$1.74	$4.26	$3.49	$2.35	$1.83	$2.38	$1.68
Average establishment cost/plant[a]		$0.28	$0.32	$0.59	$0.44	$0.40	$0.42	$0.45
Average maintenance cost/plant/year	$0.36	$0.24	$0.36	$0.24	$0.24	$0.24	$0.24	$0.24
Total annual costs/plant	**$7.97**	**$2.26**	**$4.94**	**$4.32**	**$3.03**	**$2.47**	**$3.04**	**$2.37**
Average number of potentially marketable stems/plant[b]	29	31	54	39	33	38	25	30
Number of plants/acre[c]	605	907	605	907	907	907	907	907
Average potential gross income/plant[d]	**$15.30**	**$12.40**	**$18.15**	**$17.98**	**$12.21**	**$15.20**	**$9.75**	**$11.64**
Gross income/acre[e]	**$9,256**	**$11,246**	**$10,981**	**$16,308**	**$11,074**	**$13,786**	**$8,843**	**$10,557**
Average potential net income/plant[f]	**$7.33**	**$10.14**	**$13.21**	**$13.66**	**$9.18**	**$12.73**	**$6.71**	**$9.27**

a. Derived from Table 3. Total establishment costs after two growing seasons, divided by number of plants/1,000 ft (333 m) row, divided by an assumed 10-year plant life. Scarlet Curls®, curly and pussy willow at 6 ft (.91 m) in-row spacing, all others at 4 ft (.45 m) in-row spacing. Average arvest data maintenance costs use the same calculation based on third and subsequent year maintenance costs (see Table 3).

b. From Table 2, 5th and 6th harvest data. Average number of marketable stems for Scarlet Curls®, conkscrew and pussy willow include 1.5 ft–5 ft (0.5–1.5 m) stems. With all other species, the average number of marketable stems include 3–5 ft stems only.

c. Spaced 6 ft apart within the row, 12 ft between rows = 605 plants/acre; spaced 4 ft apart within the row, 12 ft between rows = 907 plants/acre.

d. Average gross income produced/plant is based on average number of marketable stems produced/plant of different size categories and average wholesale value received or estimated for each size category. Prices vary depending on supply, demand and quality. Specifically for each cultivar or species, Avg. gross income/plant = (# tips)(price/tip) + (# mediums)(price/medium) + (# longs)(price/long).

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