4-H WILDFLOWER PROJECT

GRADES 10 – 12

YOUR WILDFLOWER ADVENTURE BEGINS

Welcome!

As a 4-H Wildflower Project member, you will have numerous opportunities to learn so much about the world of wildflowers: botany, identification techniques, plant diversity, conservation and the environment. On the following pages you will find basic information about Indiana native wildflowers and why we should care for them.

This is the 10th to 12th grade manual in a series of exciting project booklets that will guide you through each year's wildflower project. Each year you will expand your knowledge as you complete many hands-on activities. This manual not only explains the project requirements, but also provides you with information and resources to help you explore the exciting world of native wildflowers.

Let's get started!

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INDIANA NATIVE WILDFLOWERS

An Indiana wildflower may be defined as a flowering plant that has evolved and grown naturally in the area we know as the state of Indiana since before the time the first settlers arrived.

Webster's dictionary defines a wildflower as a plant that can survive without cultivation. These plants are able to grow on their own without cultivation. Wildflowers are adapted to the local growing conditions, surviving and generally flourishing in the natural landscape. A plant can be native to a region, state or just a certain valley, so there are plants that are found only in specific areas of the state, such as the Indiana Dunes or southern hills and lowlands of our state. Every area has a group of plants that have lived there naturally for hundreds, even thousands, of years. Those plants are called the area's native flora.

To understand the concept of "native," it is important to understand the term "non-native." Non-native plants may be known as introduced, alien or exotic, all of which mean that the plants did not originate in Indiana. Many non-natives plants have escaped from cultivation and now grow wild in our state. These include Queen Anne's lace, dandelions, chicory, dame's rocket, and the orange Asiatic daylilies that grow along the edges of country roads. Some people refer to these plants as wildflowers because they have been here so long that they assume these plants have always been here. Actually these non-natives plants were introduced to our state from other parts of the world. Many of these non-native plants are actually native to Europe and were brought here by settlers for food, medicine, or ornamentation. Other plants came by chance; their seeds may have been mixed in with agricultural seeds or even been part of the bedding used on ships that crossed the Atlantic to bring settlers or goods to a young United States.

PROJECT REQUIREMENTS, GRADES 10-12

1. Identify the number of Indiana native wildflowers that equals your grade level (10 for 10th grade, 11 for 11th grade, 12 for 12th grade)
2. Complete a wildflower identification sheet for each wildflower (page 9 – duplicate as needed)
3. Define vocabulary – (see pages 10-12 and select grade level) – duplicate pages as needed
4. Study three Indiana invasive flowers and plants and Exhibit pictures with form – pages 24-27 – 10th grade only

   Study three Indiana naturalized plants and Exhibit pictures with form – pages 28-30 – 11th grade only

   Design a landscape using Indiana native wildflowers and Exhibit plan – pages 31-32 – 12th grade only
5. Grow and maintain for at least one year, three varieties of Indiana native wildflowers from seed – pages 13 and 23
6. Complete Propagation Records (one for each type of seed) – page 23 (duplicate as needed)
7. Perform a Community Service project – page 34
8. Keep a journal – page 34
9. Complete 4-H Wildflower Project Record sheet – page 44 (duplicate as needed)

EXHIBIT REQUIREMENTS, GRADES 10-12

Select interesting Indiana wildflowers to study and exhibit (10 for 10th grade, 11 for 11th grade, and 12 for 12th grade). Write in your nature journal, making at least as many entries as your grade level.

1. Choose the exhibit medium that most interests you – you may mix your media if you choose. The three choices are:
    a. Photographs
        i. One (1) site photo and one (1) chose-up photo of each plant
        ii. Photo must be at least 4" x 6" – color or black and white
        iii. Mount both photos of each plant on the same page of black paper
        iv. Label each photo with botanical and common names
    b. Drawings or paintings
        i. One drawing or painting of each plant
        ii. Drawings or paintings must be a minimum of 4" x 6", maximum 5" x 7"
        iii. Drawings or paintings of each plant must be mounted on black paper
        iv. Label each drawing or painting with botanical and common names
        v. Art media may include:
            Line drawings – pencil or black ink on white paper
            Colored pencils – on white paper
            Water color – on white paper
    c. Collection of native wildflowers in Indiana
        i. Collect only those wildflowers listed on page 8
        ii. Collect and dry each plant, including the bloom, stem and at least one pair of leaves. No roots!
        iii. Mount each plant on black paper
        iv. Label each plant with common and botanical names
2. Identify each plant by completing a Wildflower Identification worksheet (page 9) and include in the exhibit notebook.
3. Complete the Vocabulary Worksheet for your grade level – pages 10-12 – include in notebook.

4. (10th grade only) Pictures of three Indiana Invasive Flowers and Plants and matching identification sheets – pages 24-27 – include in notebook
5. (11th grade only) Pictures of three Indiana naturalized plants and matching identification sheets – pages 28-30 – include in notebook
6. (12th grade only) List of plants used in your landscape design – pages 31-32
7. Grow three wildflowers from seed: complete a Propagation Record for each – page 23 – include in notebook.
8. (11th and 12th only) Fill in over-winter section of Propagation Record – page 23, describing previous year's plants.
9. Keep a nature journal – page 34 – making as many new entries as your grade level. Display.
10. Complete Community Service segment – page 34 – record on 4H wildflower Project Record (page 44); 4H Club Leader needs to sign this segment in addition to the project record sheet.
11. Complete 4H Wildflower Project Record (page 44 – 4H Club Leader must sign); include in exhibit notebook.
12. Exhibit notebook should be a 3-ring binder with items in this order (since the notebook "builds" over the 10 year course of the project, put newest items in the front):
    a. Each page of identification photographs, drawings, paintings and/or dried plants should be opposite the appropriate Identification sheet (all information must be visible at once)
    b. (Grade 10 only) photos or drawings of invasive flowers and plants opposite their ID sheets
    c. (Grade 11 only) photos of naturalized plants opposite their ID sheets
    d. (Grade 12 only) list of plants used in your landscape design
    e. Vocabulary Worksheet for your grade level
    f. Propagation Records – three records
    g. 4H Wildflower Project Record with Community Service Segment
13. Display journal in small book next to binder, on sheets tucked in the front pocket of the binder or inserted in the notebook before the Project Record sheet.
14. (Grade 12 only) Display landscape design on poster board next to project binder (see page 31 for size and orientation of poster)

NATIVE WILDFLOWERS THAT MAY BE COLLECTED AND PRESSED

This is a selected list of Indiana wildflowers that may be cut and pressed (no roots) for your exhibit. Please do NOT collect from any public park, or state or national woods, or other protected area. Obtain permission of the landowner before picking any flower and take only what you need for your exhibit. Remember, we **strongly** recommend that your first choice is to photograph, draw or paint wildflowers for your exhibit instead of actually collecting specimens! Take reliable wildflower identification books on your hikes for identification purposes. *Please do not pick any endangered or threatened wildflowers nor pick any wildflowers not on this list.*

Anemone, American wood – *Anemone quinquefolia*	Joe Pye Weed – *Eupatorium purpureum* & *E. maculatum*
Angelica – *Angelica atropurpurea* or *A. venenosa*	Leatherflower – *Clematis viorna*
Aniseroot – *Osmorhiza longistylis*	Lobelia, blue – *Lobelia siphilitica*
Arrowhead, Common – *Sagittaria latifolia*	Loosestrife – *Lysimachia ciliata & L. quadrifolia*
Aster, Heath or Goodbye Meadow – *Aster pilosus*	Lopseed – *Phryma leptostachya*
Aster, New England – *Aster novae-angliae*	Licorice, Wild – *Galium circaezans*
Avens, White & Rough – *Geum canadense & G. laciniatum*	Marigold, Marsh – *Caltha palustris*
Beardtongue – *Penstemon calycosus & P. digitalis*	May Apple – *Podophyllum peltatum*
Bedstraw or Wild Madder – *Galium* spp. (natives only)	Milkweed, Common – *Asclepias syriaca*
Beggar's Ticks, Tickseed – *Bidens* spp. (but not *cornata*)	Milkweed, Swamp – *Asclepias incarnata*
Bellflower, American – *Campanula americana*	Milkweed, Whorled – *Asclepias verticilliata*
Bellwort, Large-flowered – *Uvularia grandiflora*	Monkey Flower – *Mimulus ringens*
Bishop's Cap, 2 leaved Mitrewort – *Mitella diphylla*	Obedient Plant – *Physiostegia virginiana*
Black-eyed Susan – *Rudbeckia hirta*	Phlox, Downy & Smooth – *Phlox pilosa& P. glaberrima*
Blazing Star – *Liatris aspera & L. spicata*	Phlox, Woodland – *Phlox divaricate*
Blue Cohosh – *Caulophyllum thalictroides*	Puccoon, Hairy – *Lithospermum caroliniense*
Blue Flag Irish – *Iris virginica*	Pussytoes – *Antennaria* spp
Blue Vervain – *Verbena hastata*	Rattlesnake Master – *Erynigium yuccifolium*
Boneset, Common – *Eupatorium perfoliatum*	Rose mallow – *Hibiscus laevis*
Butterflyweed – *Asclepias tuberosa*	Rue anemone – *Thalictrum thalictroides*
Carrion Flower, Common – *Smilax lasioneura*	Senna, Northern Wild – *Senna hebecarpa*
Chickweed, Star – *Stellaria pubera*	Sneezeweed – *Helenium autumnale*
Cinquefoil, Old Field – *Potentilla simplex*	Solomon's Seal – *Polygonatum biflorum & P. pubescens*
Cleavers – *Galium aparine*	Spatterdock – *Nuphar lutea*
Compass Plant – *Silphium laciniatum*	Spiderwort – *Tradescantia virginiana*
Coneflower, Grey-Headed – *Ratibida pinnata*	Spring Beauty – *Claytonia virginica*
Coneflower, Purple – *Echinacea purpurea*	Spurge, Creeping – *Euphorbia supina*
Coreopsis – *Coreopsis* spp, but not *grandiflora*	Squirrel Corn – *Dicentra canadensis*
Cow Parsnip – *Heracleum sphondylium*	Sunflower – *Helianthus* spp, but not *petiolaris* or *augustifolia*
Cress, Common or Creeping – *Rorippa palustria, R. sylvestris*	Sweet Cicely – *Osmorhiza claytonii*
Cress, Spring – *Cardamine bulbosa*	Tick trefoil – *Desmodium* spp, but not smooth or velvety
Cup Plant – *Silphium perfoliatum*	Toothwort – *Cardamine concatenata*
Daisy Fleabane – *Erigeron annuus*	Turtlehead – *Chelone glabra*
Dutchman's Breeches – *Dicentra cucullaria*	Violet– *Viola sororia, V. cucullata* & *V. canadensis*
Evening Primrose, Common – *Oenothera biennis*	Virginia Bluebells – *Mertensia virginica*
False Sunflower – *Heliopsis helianthoides*	White Snakeroot – *Eupatorium rugosum*
Feverfew, American – *Parthenium integrifolium*	Waterleaf – *Hydrophyllum* spp
Geranium, Wild (Cranesbill) – *Geranium maculatum*	Wild Cucumber – *Echinocystis lobata*
Goatsbeard – *Aruncus dioicus*	Wild Garlic – *Allium canadense*
Golden Ragwort – *Packera aurea* & *P. obovata*	Wild Leak – *Allium burdickii*
Goldenrod – *Solidago* spp. & *Euthamia* spp.	Wild Lettuce – *Lactuca,* only *canadensis, biennis* & *floridana*
Heal-All or Self-Heal – *Prunella vulgaris*	Wild Petunia – *Ruellia* spp.
Horsemint – *Monarda punctata*	Wild Quinine – *Parthenium integrifolium*
Ironweed, Tall – *Vernonia gigiantea*	Wild Strawberry – *Fragaria virginiana*
Jewelweed – *Impatiens pallida* & *I. capensis*	Wood Sorrel – *Oxalis fortana* & *O. stricta*

WILDFLOWER IDENTIFICATION

(Include in exhibit notebook)

Scientific name:_____

Common name(s):_____

Exact location of specimen:

Address: _____

City, town or

Rural area: _____

County: _____

State: Indiana _____

Date photographed, drawn or painted, or collected:_____

Identifying Characteristics - (check those that apply)

Leaves:

- ☐ Alternate
- ☐ Opposite
- ☐ Whorled
- ☐ Basal
- ☐ Entire
- ☐ Toothed
- ☐ Lobed
- ☐ Divided
- ☐ Hairy
- ☐ Smooth

Stem:

- ☐ Smooth
- ☐ Fuzzy
- ☐ Square
- ☐ Round

Blooms:

- ☐ Regular
- ☐ Irregular
- ☐ Indistinguishable

Your Initials_____

Date_____

VOCABULARY WORKSHEET – GRADE 10

Write the definitions of the following words. Include this sheet in your exhibit notebook

Parts of a Plant

Creeping_____

_____

Trailing_____

_____

Prostrate_____

_____

Runner_____

_____

Bulb_____

_____

Tuber_____

_____

Rootstock_____

_____

Recurved_____

_____

Reflexed_____

_____

Axil_____

_____

VOCABULARY WORKSHEET – GRADE 11

Write the definitions of the following words. Include this sheet in your exhibit notebook

Parts of a Plant

Leaflet_____

_____

Lance-shaped_____

_____

Globular_____

_____

Egg-shaped_____

_____

Joint_____

_____

Capsule_____

_____

Pod_____

_____

Pistillate_____

_____

Staminate_____

_____

Lip_____

_____

Spur_____

_____

VOCABULARY WORKSHEET – GRADE 12

Write the definition of the following words. Include this sheet in your exhibit notebook.

Plant Terminology

Corymb_____

_____

Cyme_____

_____

Family_____

_____

Genus_____

_____

Halberd-shaped_____

_____

Involucre_____

_____

Parasite_____

_____

Rhizome_____

_____

Rib_____

_____

Saprophyte_____

_____

Species_____

_____

Wetlands_____

_____

GROW YOUR OWN!

Very soon you will become a sower of seeds. Study the plant list and the Propagation Requirements from Seed, beginning on page 14. This information will guide you as you decide which seeds you would most like to plant. Then study General Tips for Starting Seeds Indoors on page 22. Gather all your supplies and seeds necessary for success. Have fun!

1. Choose three varieties of Indiana native plants to grow from seed.
2. Research additional information about your plant choice.
3. Plant seeds – minimum of ten each, as not all will germinate
4. Complete a Propagation Record provided on page 23 for each variety and include in your exhibit notebook.
5. Keep your seedlings growing and plant them in a permanent garden home this fall. Read "Over-Winter Wildflower Plants" page 33 for suggestions on how to help them survive a typical Indiana winter.
6. If you grew wildflower plants from seed last year that you overwintered, fill out the part of the Propagation Record Sheet – page 23 (final 3 questions) – that deals with overwintered plants.

PROPAGATION REQUIREMENTS FROM SEED

Alumroot; *Heuchera americana*; perennial; germinates in 10-60 days, requires light and 60-70 degrees; start 8-10 weeks before transplanting

American Bellflower; *Campanula americana*; perennial; difficult, germinates in 14-28 days, requires light and 60-70 degrees; start 8-10 weeks before transplanting

American Lotus or Waterlily; *Nelumbo lutea*, perennial; germinates in 14-30 days, scarify seed and submerge in hot water (75-85 degrees), change water twice a day until it germinates

Anemone (Woodland); *Anemone quinquefolia;* perennial; germinates in 15-180 days; stratify 2-3 weeks; sow in a flat, sink the flat in the ground in a shady location, cover with glass, transplant as seedlings appear

Angelica; *Angelica venenosa*; biennial; easy; direct seed in late summer, requires light and 60 degrees; germinates in 4 weeks

Arrowhead; *Sagittaria latifolia*; perennial; grow from seed or fall division

Aster; *Aster* spp.; perennial; easy; germinates in 14-36 days; stratify for 2 weeks and provide 70-75 degrees thereafter; start 6-8 weeks before transplanting

Beardtongue; *Penstemon calycosus and P. digitalis*; perennial; germinates in 18-36 days, requires light and 55-65 degrees; start 8-10 weeks before transplanting

Bedstraw; *Galium* spp.; perennial; grows easily from seed

Bellwort; *Uvularia grandiflora*; perennial; sow in flats, sink flats in ground against north facing wall, cover with glass, moisten soil occasionally; germinates in 30-180 days, germinates only outdoors

Bishop's Cap; *Mitella diphylla*; perennial; sow outdoors, requires dark (usually propagated by runners)

Black-eyed Susan; *Rudbeckia hirta*; perennial; easy; stratify for 2 weeks in moist growing medium in refrigerator; provide light and 70 - 75 degrees

Blazing Star; *Liatris spicata*; perennial; germinates in 20-25 days. Sow seeds in flats, barely cover, requires 55-75 degrees. Start 8-10 weeks before transplanting

Blood root; *Sanguinaria canadensis*; perennial; germinates in 30-90 days; start indoors in peat pots at 50-55 degrees; start 8-10 weeks before transplanting; or sow in flats and sink flats in ground against north facing wall, cover with glass, moisten soil occasionally

Blue Cohosh; *Caulophyllum thalictroides*; perennial; propagate by division or cutting

Blue Lobelia; *Lobelia siphilitica*; perennial; germinates in 15-21 days; requires light, stratify for 3 months, then grow at 65-75 degrees; watch for damping off; don't overwater

Blue-eyed Mary; *Collinsia verna*; annual; germinates in 14-21 days; requires 65-70 degrees, sow outdoors when soil is cool and light frost is still possible

Boneset; *Eupatorium perfoliatum*; germinates in 1-3 months, do not cover seeds

Bottle Gentian; *Gentiana andrewsii*; perennial; difficult; germinates in 14-180 days; requires dark, stratify for 8 weeks; grow at 70-75 degrees thereafter

Bunchberry; *Cornus canadensis*; perennial; remove seed from fleshy fruit; sow in flat of peat moss and sand, requires dark, sink flat in ground against north facing wall for winter, cover with glass

Butterflyweed; *Asclepias tuberosa*; and Common Milkweed; ***A. syriaca***; sow seeds in peat pots; secure in plastic bags, and refrigerate for 21 days; provide light and 50-75 degrees thereafter

Cardinal Flower; *Lobelia cardinalis*; perennial; germinates in 15-21 days, requires light; stratify for 3 months, then grow at 65-75 degrees; watch for damping off-don't overwater; needs rich, moist soil

Carrion Flower; *Smilax* spp; Plant ripe berries (blue-black) in woods and thickets in late fall or very early spring; somewhat vine-like; will climb all over bushes.

Cinquefoil; *Potentilla simplex*; stratify in moist conditions in refrigerator for 6 weeks, grow at 65-70 degrees; germinates in 14-30 day**s**

Columbine; *Aquilegia canadensis*; perennial; germinates in 30-90 days, stratify for 2-3 weeks, sink flat in the ground in a shady location and cover with glass

Compass Plant; *Silphium laciniatum*; stratify for 2 weeks and provide 70-75 degrees thereafter; start 6-8 weeks before transplanting

Coneflower, Grey-headed; *Ratibida pinnata*; direct seeding: collect seed in fall after it becomes dark and sow outdoors immediately; for spring seeding stratify in refrigerator for at least one month before planting

Coneflower, Pale Purple; *Echinacea purpurea*; direct seeding: collect seed and sow outdoors immediately; for spring seeding stratify in moist cold for 3-4 months

Coreopsis; *Coreopsis lanceolata*; easy perennial; sow seeds indoors under 70 degrees in moist conditions; germination in 2-4 weeks

Corydalis; *Corydalis flavula*; difficult; germinates in 30-365 days, requires light; sow seed and place at 60-65 degrees for 6-8 weeks, then chill in refrigerator for 2 weeks, then put back at 60-65 degrees

Cow Parsnip; *Heracleum sphondylium*; perennial; germinates in 30-90 days; requires dark; in spring, stratify for 2-3 weeks, sow in flat, sink flat in ground against a north facing wall, cover with glass

Cup Plant; *Silphium perfoliatum*; perennial; germinates in 21 days; requires dark, scarify seeds, sow in flats, sink flats in ground against a north facing wall, and cover with glass

Daisy Fleabane; *Erigeron annuus*; perennial; germinates in 10-25 days, requires light and 70 degrees; start 8-10 weeks before transplanting

Dutchman's Breeches; *Dicentra cucullaria*; perennial; germinates in 30-365 days, stratify in freezer for 6 weeks, then grow at 55-60 degrees thereafter; germinates in midsummer

Evening Primrose; *Oenothera* spp.; perennial; germinates 5-30 days; start 8-10 weeks prior to transplanting; sow seed in peat pots, requires darkness, 65-70 degrees

False Dragonhead; *Physostegia virginiana*; perennial; germinates in 15-30 days at 60-65 degrees; start 8-10 weeks before transplanting

False Foxglove; *Aureolaria flava*: germination in 10-15 days at 55-65 degrees, cover completely, needs darkness to germinate; sow directly into peat pots if indoors, as it resents transplanting, direct sow outdoors in early spring

False Rue Anemone; *Enemion biternatum* [formerly *Isopyrum biternatum*]; keep seeds cold and moist in refrigerator all winter, then plant in pots in February, and transplant outside in May in rich, moist, shady wooded area; or plant outdoors in fall

False Solomon's Seal; ***Smilacina racemosa***; perennial; sow seed as soon as it ripens, separate seed from fleshy fruit, sow in flats, sink flats in ground against north facing wall, cover with glass; germinates in 30-180 days

False Sunflower; ***Heliopsis helianthoides***: needs full sun or partial shade; ripened seeds should be planted immediately in the fall and left in ground for spring germination; average well-drained moist soil; thin plants to 1' - 3' apart; mulch well. (Even though these are the preferences, it can grow on gravel and it tolerates drought. Divide every 3 to 4 years by cutting apart the stocky rhizomatous rootstock with a knife, leaving at least 2 or 3 eyes in each division.)

Fringed Loosestrife; *Lysimachia cilliata*; perennial; germinates in 30-90 days; in autumn sow in flats, sink flats in ground against north facing wall and cover with glass

Goatsbeard; *Aruncus dioicus*; perennial; germinates in 30-90 days, requires light and 55-65 degrees; start in late winter

Golden Ragwort; *Packera aurea*; perennial; germinates in 10-21 days; start 6-8 weeks before transplanting; needs light and 65-75 degrees; sow in vermiculite; water only from below; highly susceptible to damping-off

Golden rod; *Solidago* spp.; perennial; easy; germinates in 14-42 days at 50 degrees; start 6-8 weeks before transplanting

Green Dragon; *Arisaema dracontium*; perennial; difficult; germinates in 30-180 days; separate seed from fleshy fruit, stratify for 6 weeks, grow at 55-60 degrees

Ground Cherry; *Physalis virginiana*; perennial; difficult; germinates in 15-30 days, requires light and 70-75 degrees

Hepatica; *Hepatica acutiloba*; perennial; use seed as soon as ripens, stratify 3 weeks in moist medium, then grow at 50-55 degrees in peat pots or outdoors in shady to partially shaded wooded area; plant immediately after stratification

Hoary puccoon; *Lithospermum canescens*: propagate by cuttings; grow in peat enriched soil in sun, or on rocky or gravelly slopes and margins of grasslands; good in rock gardens

Horsemint; *Monarda punctata*; perennial; germinates in 10-40 days, requires 60-70 degrees; start 8-10 weeks before transplanting

Ironweed, tall; *Vernonia gigantea* and Missouri Ironweed (*V. missurica*); likes moist meadow situations, with neutral to slightly acidic soil; sun to partial sun; propagate by dividing its roots with an axe or chainsaw (ADULTS ONLY!); can be cut back in June to a more manageable size

Jack-in-the-Pulpit; *Arisaema triphyllum*; perennial; difficult; remove seed from fleshy fruit; stratify for 6 weeks and provide 55-60 degrees thereafter; germinates in 30-180 days

Jerusalem Artichoke; *Helianthus tuberosus*; perennial; propagate by tuber division

Jewel Weed; Jewelweeds - there are two

Spotted Touch-me-not (***Impatiens capensis)*** orange with reddish-brown spots.

Pale Touch-me-not *(I. pallida)* light yellow with few or no spots. After flowering, pods are formed. When they start to turn from green to tan to brown, cover with a very fine netting to catch seeds before they disperse. Plant in fall where you want the plant to come up in spring. They can spread VERY freely.

Joe Pye Weed; *Eupatorium purpureum*; perennial; germinates in 30-90 days, requires 55 degrees; start 8-10 weeks before transplanting

Leather Flower; *Clematis viorna*; perennial; germinates in 30 days to 3 years; in spring stratify in freezer for 3 weeks, sow in flat, sink flat in ground in shaded location, cover with glass, transplant seedlings as soon as they appear

Lopseed; Phryma *leptostachya*; Plant in rich woods in late fall or early spring, as they bloom In summer, only one seed is formed in the carpel, enclosed in the tubular calyx that "lops" down against the stalk; harvest this in fall, plant immediately in neutral to moderately acid soil in open woods or woodland garden

Marsh Marigold; *Caltha palustris*, perennial, sow seed outdoors in peat pots standing in shallow water, germinates in 30-90 days

Mayapple; *Podophyllum peltatum*; perennial, difficult, sow seed as soon as ripens (late summer to September) in flat, sink flat in ground against north facing wall, cover with glass; germinates in 30 180 days

Milkweed, Common; *Asclepias syriaca*; germinates 30-90 days, start 8-10 weeks before planting outside; sow seeds in peat pots, secure in plastic bags, refrigerate for 21 days; provide light and 50-75 degrees

Milkweed, Swamp; *Asclepias incarnata*, sow outdoors in late fall; moist area

Milkweed, Whorled; *Asclepias verticillata*, sow outdoors in late fall; dry area

Monkey Flower; *Mimulus ringens*; perennial; germinates in 7-21 days, requires light, stratify for 3 weeks, provide 70-75 degrees thereafter; start 10-12 weeks before transplant

Partridge Pea; *Chamaecrista fasciculata*; annual; germinates in 5-90 days; requires dark; chip seed with sharp knife and soak in warm water for 2-3 hours, grow at 70-75 degrees; start 6-8 weeks before transplanting

Pussytoes; *Antennaria neglecta*; perennial; germinates in 30-60 days, requires 55-60 degrees; start in late winter

Rattlesnake Master; *Eryngium yuccifolium*; direct sow outdoors in autumn in full sun; needs moist well-drained soil

Rose Mallow; *Hibiscus laevis*; perennial; germinates in 10-30 days; chip seed and soak in hot water for 1 hour, requires light and 70-80 degrees; start 8 weeks before transplanting

Rue Anemone; *Thalictrum thalictroides*; perennial; tuber; propagate by division

Shooting Star; *Dodecatheon media*; perennial; difficult; germinates in 90-365 days, requires light, stratify for 3 weeks, grow at 60-70 degrees

Skunk Cabbage; *Symplocarpus foetidus*; perennial; collect seeds in late summer; germinates in 30-60 days, requires dark and 55-65 degrees; sow in flat and stand flat in pan of water to keep moist

Slender Mountain Mint; *Pycnanthemum tenuifolium*; propagate by taking root cuttings

Sneezeweed: *Helenium autumnale*; perennial; germinates 7-10 days; start 8-10 weeks before transplanting; needs dark and 70 degrees

Solomon's Seal; *Polygonatum biflorum*; perennial; stratify for 2-3 weeks, sow in flat, sink in ground in shade location, cover with glass

Spatterdock or Yellow Pond Lily or Cow Lily; *Nuphar lutea*; flowers float or are immersed in shallow waters or muddy shores; spreads rapidly; not good for a small garden pool; sow seeds in sand and cover with sand; place pan in water of 70 to 80 degrees; the surface of the sand should be above the water line, but in contact with it. 2-3 weeks to first floating leaf; transplant to flats with 2" soil/compost mix; pot up as necessary before planting outside and after planting outside to restrain spreading

Spiderwort; *Tradescantia* spp.; perennial; germinates in 10-40 days; grow at 55-56 degrees, barely cover seed; grow in fertile, well-drained soil in a warm, sheltered site in sun or partial shade; provide a deep winter mulch

Spring Beauty; *Claytonia virginica*; perennial; seeds rarely available; germinates in 14-21 days and requires dark; sow seeds as soon as ripe in flats outdoors (late summer), sink flats in ground against north facing wall and cover with glass, moisten soil occasionally

Spring Cress; *Cardamine bulbosa*: plant seeds in boggy areas in fall or very early spring or divide the small bulbous tubers; moist humusy soil; partial shade; white bloom in late spring

Squirrel Corn; *Dicentra canadensis*; perennial; germinates in 30-365 days; in midsummer stratify seed for 6 weeks, grow at 55-60 degrees

Starry Campion or Starry Catchfly; *Silene stellata*: plant ripe seeds in open woods, or divide by cutting through the roots, or take cuttings and root them in sandy soil in a cold frame, shaded from the sun, until rooted; once established, the plants should not be moved; partial shade; plant transplants in dry, sandy, or clay soil.

Sweet Cicely; *Osmorhiza claytonii*; perennial; germinates in 14-42 days and requires light; stratify seeds in freezer for 1 month; grow on at 55-65 degrees

Tick Trefoil; *Desmodium canadense*; perennial; requires dark to germinate; nick seed coat before planting; takes 2-4 weeks to germinate

Toothwort, Cut-leaved; *Cardamine concatenata*; perennial; grow from seed as soon as seed is ripe

Trillium; *Trillium* sp.; perennial; difficult; germinates in 18 months to 3 years; as soon as seed is ripe stratify for 3 months in moist starting mix, then place at 60-70 degrees for 3 months, repeat this entire cycle again

Turtlehead; *Chelone glabra*; perennial; requires dark to germinate; stratify seed for 4 months

Twin Leaf; *Jeffersonia diphylla*; perennial; takes up to 2 years to germinate; as soon as seed is ripe (autumn) sow seed sparsely in flats outdoors, sink flats in ground against north facing wall and cover with glass, moisten soil occasionally

Violets; *Viola* spp; perennial; germinates in 50 days; sow seeds in flats outdoors in autumn, sink in ground against north facing wall and cover with glass, moisten soil occasionally

Virginia Bluebells; *Mertensia virginica*; perennial; germinates in 30-60 days, as soon as seed is ripe (late summer) sow seed sparsely in flats outdoors, sink flats in ground against north facing wall and cover with glass, moisten soil occasionally

Waterleaf; perennial; propagate in spring or fall by division; open woods in neutral or slightly acid soil or in a woodland garden; there are four species:

Appendaged; *Hydrophyllum appendiculatum*
Broad-leaved; *H. canadense*
Large-leaved; *H macrophyllum*
Virginia; *H. virginianum*

White Snakeroot; *Eupatorium rugosum*; perennial; germinates in 30-90 days, requires 55 degrees; start 8-10 weeks before transplanting

Wild Cucumber; *Echinocystis lobata*; annual; grows from seed

Wild Garlic; *Allium canadense*; perennial; grows from bulbs and bulblets

Wild Ginger; *Asarum canadense*; perennial; easy; germinates in 7-18 days; as soon as seed ripens stratify for 3 weeks grow on at 60-65 degrees thereafter

Wild Leek*; Allium burdickii*; perennial; difficult; germinates in 14-365 days, requires light to germinate, stratify for 30 days; grow on at 55-65 degrees; can also grow by separating bulbs and replanting

Wild Lettuce; *Lactuca canadensis*; biennial; grows from seed

Wild Petunia; *Ruellia humilis*; perennial; seeds rarely available; germinates in 30-60 days, requires 65-75 degrees; start 8-10 weeks before transplanting

Wild Sarsaparilla; *Aralia nudicaulis*; perennial, as soon as seed is ripe (autumn) soak seed for 1/2 to 1 hour in sulfuric acid (ADULTS ONLY!), wash in water and plant immediately

Wild Strawberry; *Fragaria virginiana*; propagates by runners

Wood Sorrel; *Oxalis fontana*; annual; sow in autumn as soon as seed is ripe; germinates in 14-60 days; requires 55-70 degrees

Woodland Sunflower; *Helianthus divaricatus*; gather seeds in fall when ripe (put an old nylon stocking over the flower head to keep birds away and harvest when seeds are dry); keep dry and cool all winter indoors (above 35 degrees); plant outside about May 15 in dry open woods (but keep moist during first growing season)

Yellow Pimpernel; *Taenidia integerrima*; annual; sow seed outdoors; requires dark, 50-65 degrees; germinates in 30-42 days

GENERAL TIPS FOR STARTING SEEDS INDOORS

Also check Propagation Requirements from Seed pages

Containers: Containers should be fairly shallow (1-3 in. deep) and have drainage holes. Containers should be cleaned in soapy water and rinsed in a solution of 1 part bleach to 10 parts water, followed by a plain water rinse. Let them dry before filling with starting mix.

Soil: A soilless starting mix without fertilizer should be used

Water: Should not contain chlorine or salt. For salt-free, use non-softened water (draw water before it enters the water softener or draw water from an outside tap). For chlorine-free, let water sit overnight in open jugs while the chlorine evaporates. It is best to bottom water the plants and seeds, though you may need to mist the top of the soil with a spray bottle until germination occurs.

Light: Some seeds require dark to germinate and should be covered with soil (2-3 times the thickness of the seed). Other seeds require light to germinate and should be left on top of the soil. Some seeds have no preference. Once the seedlings have emerged, they should be kept 3-4 inches away from fluorescent bulbs for 14-16 hours a day. Any fluorescent bulb with "daylight" in its description will work as will LED.

Stratify (Stratification): cold treatment given to damp seeds for a specific length of time before sowing.

Scarify (Scarification): sand, nick or chip a hard seed coat (coat only) before sowing

Seeding: Moisten (don't soak) soilless starting medium in a bucket. Fill planting containers by scooping and tap the container on a table a few times to settle the soil to below brim level. Place seed on top of soil. (See direction under light above.) Mist with water. Cover pots with clear plastic (bag, wrap or lid), keeping plastic off the soil surface. Top of soil should be kept moist until the seed germinates.

Temperature: Most Indiana native plants germinate between 55-72 degrees. Most seedlings do best at 60-65 degrees at night and 65-70 degrees during the day.

Fertilization: after the true leaves (2nd set) appear, start using water soluble 15-30-15 fertilizer diluted 4-fold more than recommended. (Example: if the label says 1 tsp. per gallon, use ¼ tsp. per gallon) Watch carefully, some natives do not like to be fertilized.

Damping-Off: a fungal disease causing stem to close and plant to die; caused by too much moisture

Growing-on: after seedlings are established, they will need a drier medium. Allow surface of the soil mix to become dry to the touch between watering, but never let the lower soil layers dry out. If plants are drooping, mist them.

Hardening-Off: transplants must get used to the sun, wind, and rain. Move plants outdoors to a shady sheltered area during the day. Keep them watered. Bring them back indoors each evening. After 3 days, move sun-loving plants to a half sun location for three more days. Allow the plants to stay out overnight for at least two days before planting.

PROPAGATION RECORD – GRADES 10-12

(Include in exhibit notebook)

Flower name, Common_____

Flower name, Botanical (Scientific)_____

Date planted_____

Garden soil type (sandy, loam or clay?)_____

Germination date:_____

If sown outdoors, date transplanted outdoors_____

Flower Name	Light or Dark	Temp Required	Stratify, Scarify, Presoak	Growth Habit	Comments
e.g. Yarrow	Light	60-65	None	Compact	

Environmental Factors (check as appropriate)

☐ Especially cold weather ☐ Especially hot weather

☐ Drought conditions Other (list): _____

Did the plant(s) you grew last year come back? Describe or explain your experience. _____

_____

_____

Name the birds, butterflies and/or other insects attracted to these plants/flowers?_____

_____

_____

Describe the plants' mode of reproduction (self-seed, send up new shoots, layering)_____

_____

INDIANA INVASIVE FLOWERS AND PLANTS – 10TH GRADE only

(Include in your exhibit notebook)

Choose three invasive plants and flowers to study and exhibit. A list of some of our most prolific invasive flowers and plants, plus where to look for further information is on pages 25-26.

Choose the exhibit medium that most interests you – you may mix media if you choose. The choices are:

1. Photographs
    a. One site photo and one close-up photo of each of the three plants
    b. Photos must be at least 4" x 6", color or black and white
    c. Both photos of each plant must be mounted on the same page on black paper
    d. Label each photo with scientific (botanical) name and common name
2. Drawings and paintings
    a. One drawing or painting of each of the three plants
    b. Drawings and paintings must be a minimum of 4" x 6", maximum of 5" x 7"
    c. Drawings or paintings of each plant must be mounted on black paper
    d. Label each drawing with scientific (botanical) and common names
3. Art media may include:
    a. Line drawings in pencil or black ink on white paper mounted on black paper
    b. Line drawings in colored pencils on white paper mounted on black paper
    c. Watercolor on white paper – mounted on black paper

Identify each plant by completing the Invasive Plant Identification worksheet for each plant (page 27) and include in your notebook across from the picture.

INVASIVE PLANTS IN THE MIDWEST – Grade 10 project

This is a list of some of the most common invasive plants in Indiana. For a more detailed list of invasive plants in our state with comments about the severity of the threat, search the web for Indiana Invasive Species Council at Purdue University.

Herbaceous

1. Bouncing Bet; *Saponaria officinalis*
2. Bull thistle; *Cirsium vulgare*
3. Canada thistle; *Cirsium arvense*
4. Common teasel; *Dipsacus sylvestris*
5. Crown vetch; *Coronilla varia*
6. Dame's rocket; *Hesperis matronalis*
7. Eurasian water milfoil (spiked water milfoil); *Myriophyllum spicatum*
8. Flowering rush; *Butomus umbellatus* (water plant)
9. Garlic mustard; *Alliaria petiolata*
10. Giant hogweed; *Heracleum mantegazzianum*
11. Goat's rue; *Galega officinalis*
12. Hydrilla; *Hydrilla verticillata* (water plant)
13. Japanese knotweed; *Polygonum cuspidatum*
14. Leafy spurge; *Euphorbia esula*
15. Mugwort; *Artemisia vulgaris*
16. Purple loosestrife; *Lythrum salicaria*
17. Spotted knapweed; *Centaurea stoebe*
18. White sweet clover; *Melilotus albus*
19. Wild parsnip; *Pastinaca sativa*
20. Yellow iris; *Iris pseudacorus* (water plant)
21. Yellow sweet clover; *Melilotus officinalis*

Grasses

1. Common reed (reed grass); *Phragmites australis*
2. Flowering rush; *Butomus umbellatus*
3. Japanese stiltgrass; Nepal grass; *Microstegium vimineum*
4. Johnson grass; *Sorghum halepense*
5. Maiden grass; *Miscanthus sinensis*
6. Tall fescue; *Festula arundinacea*

Vines

1. European bittersweet nightshade; *Solanum dulcamara*
2. Japanese honeysuckle; *Lonicera japonica*
3. Kudzu; *Pueraria montana*
4. Mile-a-minute-vine; *Persicaria perfoliata*
5. Oriental bittersweet; *Celastrus orbiculatus*
6. Periwinkle; *Vinca minor*
7. Wintercreeper or climbing euonymus; *Euonymous fortunei*

Shrubs

1. Amur honeysuckle; *Lonicera maackii*
2. Autumn olive; *Elaeagnus umbellata*
3. Black alder; *Alnus glutinosa*
4. Burning bush, winged euonymus or winged spindle-tree; *Euonymus alatus*
5. Chinese privet; *Ligustrum sinense*
6. Common privet; *Ligustrum vulgare*
7. Glossy buckthorn; *Frangula alnus*
8. Japanese barberry; *Berberis thunbergii*
9. Multiflora rose; *Rosa multiflora*
10. Russian olive; *Elaeagnus augustifolia*
11. Tartarian honeysuckle; *Lonicera tatarica*

Trees

1. Callery Pear; *Pyrus calleryana*
2. Chinese mulberry or white mulberry: *Morus alba*
3. Norway maple; *Acer platanoides*
4. Princess tree or empress tree; *Paulownia tomentosa*
5. Siberian elm; *Ulmus pumila*
6. Tree of heaven or stinktree; *Ailanthus altissima*

INVASIVE FLOWERS AND PLANTS IDENTIFICATION SHEET – 10th Grade only

(Include in your exhibit notebook)

Scientific name:_____

Common name(s):_____

Exact location of specimen:

Address: _____

City, town or

Rural area: _____

County: _____

State: Indiana _____

Date photographed, drawn or painted, or collected:_____

Identifying Characteristics - (check those that apply)

Leaves:

- ☐ Alternate
- ☐ Opposite
- ☐ Whorled
- ☐ Basal
- ☐ Entire
- ☐ Toothed
- ☐ Lobed
- ☐ Divided
- ☐ Hairy
- ☐ Smooth

Stem:

- ☐ Smooth
- ☐ Fuzzy
- ☐ Square
- ☐ Round

Blooms:

- ☐ Regular
- ☐ Irregular
- ☐ Indistinguishable

Your Initials_____

Date_____

INDIANA NATURALIZED PLANTS – 11TH GRADE only

(Include in your exhibit notebook)

Choose three plants that have naturalized in Indiana to study and exhibit. A list of some of the naturalized plants in Indiana is on page 29. You may have encountered others in the parks or even your own yard.

Choose the exhibit medium that most interests you – you may mix media if you choose. The choices are:

1. Photographs
    a. One site photo and one close-up photo of each of the three plants
    b. Photos must be at least 4" x 6", color or black and white
    c. Both photos of each plant must be mounted on the same page on black paper
    d. Label each photo with scientific (botanical) name and common name
2. Drawings and paintings
    a. One drawing or painting of each of the three plants
    b. Drawings and paintings must be a minimum of 4" x 6", maximum of 5" x 7"
    c. Drawings or paintings of each plant must be mounted on black paper
    d. Label each drawing with scientific (botanical) and common names
3. Art media may include:
    a. Line drawings in pencil or black ink on white paper mounted on black paper
    b. Line drawings in colored pencils on white paper mounted on black paper
    c. Watercolor on white paper – mounted on black paper

Identify each plant by completing the Naturalized Plant Identification worksheet for each plant (page 30) and include in your notebook across from the pictures.

INDIANA NATURALIZED PLANTS

Bindweed, Black (*Fallopia convolvulus*)

Bindweed, Field (*Concolvulus arvensis*)

Bladder campion (*Silene vulgaris*)

Burdock (*Artium lappa*)

Butter-and-eggs (*Linaria vulgaris*)

Celandine, Lesser (*Ficaria verna*)

Catnip (*Nepeta cataria*)

Chicory (*Chicorium intybus*)

Daisy, Ox-eye (*Leucanthemum vulgare*)

Dames Rocket (*Herperis matronalis*)

Dandelion, Red-seeded (*Taraxacum erythrosperum)*

Dayflower (*Commelina communis*)

Dead nettle (*Lamium purpureum*)

Lamb's ear (*Stachys byzantina*)

Lesser Celandine (*Ficana verna)*

Mullein, Common *(Verbascum thapsis)*

Nightshade, climbing (*Solanum dulcamara*)

Perilla (*Perilla frutescens*)

Pepperweed (*Ledipium latifolium*)

Star of Bethlehem (*Ornithogalum umbellatum*)

Stinging Nettle (*Urtica dioica*)

Yarrow (*Achillia millefolium*)

NATURALIZED PLANT IDENTIFICATION SHEET – 11TH GRADE only

(Include in your exhibit notebook)

Scientific name:_____

Common name(s):_____

Exact location of specimen:

Address: _____

City, town or

Rural area: _____

County: _____

State: Indiana _____

Date photographed, drawn or painted, or collected:_____

Identifying Characteristics - (check those that apply)

Leaves:

- ☐ Alternate
- ☐ Opposite
- ☐ Whorled
- ☐ Basal
- ☐ Entire
- ☐ Toothed
- ☐ Lobed
- ☐ Divided
- ☐ Hairy
- ☐ Smooth

Stem:

- ☐ Smooth
- ☐ Fuzzy
- ☐ Turns clockwise_____
- ☐ Turns counter clockwise_____
- ☐ Woody_____
- ☐ Herbaceous_____

Blooms:

- ☐ Regular
- ☐ Irregular
- ☐ Indistinguishable

Your Initials_____

Date_____

DESIGN A LANDSCAPE – 12th GRADE only

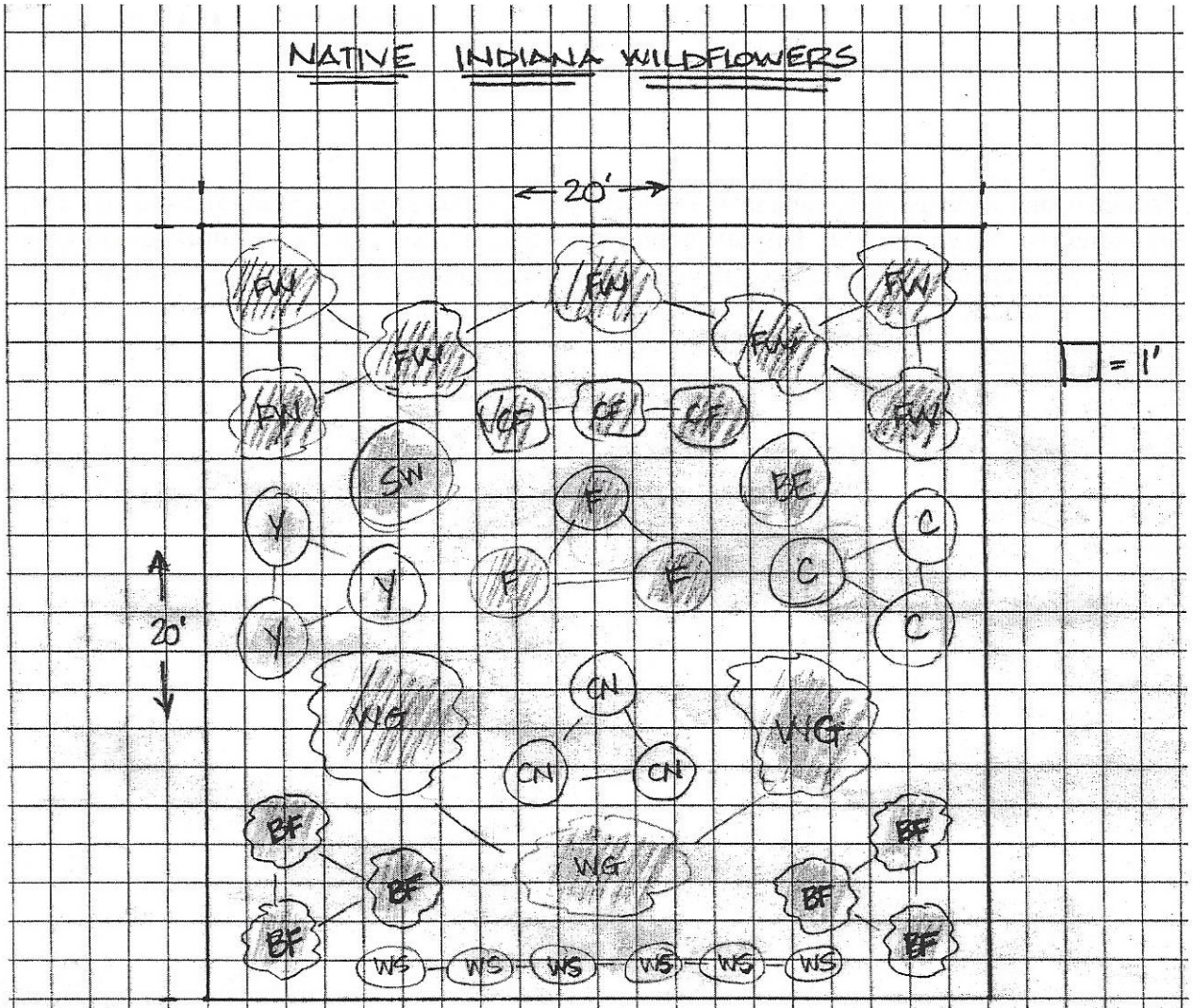
Design a landscape using Indiana native wildflowers.

1. Garden size: minimum of 20 square feet; maximum of 100 square feet
2. Landscape can be any shape and habitat (e.g. butterfly, woodland, marsh, prairie, etc.)
3. You may use any Indiana native plant (wildflowers, shrubs, trees)
4. You may include hardscape such as paths, fencing, trellis, birdbath, beehive, benches.
5. If you are redesigning a landscape, you may use existing trees, shrubs or hardscape.
6. WRITE A PLANT LIST for your landscape design, including name of plants, how many of each plant are used, code used on landscape plan, height, blooming season and color.
7. DISPLAY YOUR LANDSCAPE DESIGN ON POSTER BOARD (22" x 28" displayed horizontally and mounted on a firm backing and covered with clear plastic according to standard 4H Poster Rules)

See page 32 for an example and then create your own.

Also check Useful Books Resources (especially page 42) for extra help in landscape design.

DESIGN A LANDSCAPE EXAMPLE



#	ABBR.	PLANT	HEIGHT	BLOOMING SEASON	COLOR
7	FW	Fireweed	2-8'	summer-early fall	red
3	CF	Cardinal flower	2-5'	late summer-fall	red
1	SW	Sweet William	1-3'	spring-summer	pink
1	BE	Butter & Eggs	1-3'	summer	yellow & orange
3	C	Columbine	1-3'	spring-early summer	varied
3	F	Four o'clocks	1-3'	spring-summer	purple
3	Y	Yarrow	1-3'	spring-fall	yellow
3	WG	Wild geranium	1-2'	spring-early summer	rose purple
3	CN	Catnip	1-3'	summer-fall	white/lilac
6	BF	Blue fescue grass	1'?		blue-green
6	WS	Wild Strawberry	low	spring-early summer	white, then red-fruit

K. Arnold

OVER-WINTER WILDFLOWER PLANTS

Exhibit requirement is fulfilled by completing the Propagation Record Sheets

Caring for your wildflowers:

The clamshell or similar covered container that you sowed seed in is a suitable container for the new seedling to grow in until the plant is pushing against the top or many roots are visible in the bottom. As soon as the plant touches the top, start letting some air into the container by cracking an opening on one side for a day or two and then opening the lid. Once the plant has a number of healthy roots, carefully transplant it into a small 2-3" pot using growing mix that contains no fertilizer. (Young native plants resent fertilizer.)

Let the plants have a week or two to get used to the air. Then harden off the plant by putting it outside in partial shade for ½ day, followed by a full day and then a full day and night. Keep the plants in a sheltered area for the hottest summer months and be sure they stay moist.

In the fall, move the plants into their permanent home, carefully selecting the correct habitat. Meadow and prairie plants that thrive in full sun need a very sunny spot. Woodland flowers and shade-loving plants need a spot that is partial to full shade.

Plant out your plants in the evening; plant them at the same height they were growing in the pot. Water and mulch the transplants, keeping the mulch from pressing against or creeping up the new little stems. Apply mulch evenly 1-1.5" deep over the bed. For meadow & prairie plants, use chopped or shredded weed-free straw or other high quality mulch containing no weed seeds (no hay). For woodland plants, use shredded leaves which will decay & release nutrients slowly to feed the plants. (Hardwood mulch can be used if it is all that is available.) Mulch protects the soil from rapid temperature changes that could harm the plants and keeps the plant crowns from drying out in the winter.

Check your plants daily and water as needed. A general rule is that plants need 1" of water per week. If the soil is dry 2" down, it's time to water. It's important to keep the plants moist until the first frost. Be aware that different soil types dry out at a different rate.

In spring, remove the winter mulch from around the plants, leaving the mulch that is between the plants to help preserve moisture. If you find the soil dry, water well. Keep a close eye on your plants. Some plants, especially woodland plants, take a full year or two to establish their root system.

KEEPING YOUR WILDFLOWER JOURNAL

(Exhibit in separate book next to your notebook or exhibit, clearly marked, in the front of your notebook)

The purpose of your wildflower journal is to assist you in focusing on the wildflowers and the habitat(s) they grow in. You will need to make as many entries as the number of your grade in school (e.g. 10 entries for grade 10), though you may make additional entries if you wish. Start each entry with the date and the place, then describe what you see and how you feel about it (e.g. April 3, 2018 - The field of Virginia bluebells was awesome. I could hear the distant hooting of an owl. I saw a toad hopping around in the dry leaves under the tree.) If you prefer to draw pictures or take photographs, that's okay too. However, be sure you label each picture or photograph with the place it was drawn or taken, the date and a brief comment of what you were doing (e.g. walking on a nature trail, camping with your family, on a school field trip). Pictures must be in chronological order.

Keep your wildflower journal and add to it from year to year throughout this project. (The number of entries required starts new each year. In other words, being in the project for two years [10th and 11th grade] means at least 21 entries [total] in your journal when you exhibit the summer following 11th grade.)

COMMUNITY SERVICE SEGMENT

(Report on your project record sheet)

This is a wonderful opportunity for you to become involved in your community by doing a great service. Besides being of value to your community, you will be helping the whole environment…our planet. Choose an activity that is related to our study of Indiana native plants. A couple of ideas are: digging out and/or pulling invasive plants, such as invasive honeysuckle, garlic mustard, autumn olive, common and glossy buckthorn, privet. You might like to volunteer to do this at one of your local town, township or county parks. Another good project is to rescue native plants that are going to be destroyed by construction of roads, houses, subdivisions, etc. Make sure to have an adult with you, and have permission of the landowner before you start. It is best to have the permission in writing or to have a release form. Perhaps you could assist a park naturalist in collecting seeds in the fall. Or think of another creative way to volunteer. Make sure to enter your community service on your 4H Wildflower Project Record Sheet and get your club leader's signature. And…WE ALL THANK YOU FOR HAVING THE VOLUNTEER SPIRIT!

WHERE TO GO TO SEE WILDFLOWERS

Burnett Woods Nature Preserve: Avon

Butler Woods

Central Park: Carmel

Clifty Falls State Park

Cool Creek Park: Westfield

Crown Hill Cemetery: Indianapolis

Eagle Creek Park: Indianapolis

Fishers Heritage Park

Flowing Well Park: Carmel

Fort Harrison Park: Lawrence

Holliday Park: Indianapolis

Indianapolis Museum of Art Grounds

Marott Park: Indianapolis

McCormick's Creek State Park

McGregor Park: Westfield

Mounds State Park: Anderson

Patoka Lake (Southwestern Indiana)

Potter's Bridge: Noblesville

Ritchey Woods: Fishers

River Road Park: Carmel

Shades State Park

Starkey Park: Zionsville

Turkey Run State Park

West Park: Carmel

GLOSSARY

Alternate leaf arrangement: borne singly along a stem, one leaf at each node, not opposite each other
Annual: lives only one growing season, then dies
Anther: the pollen-bearing part of the stamen
Aquatic plants: those that grow in or on water or shorelines
Axil: upper angle formed by the main stem and any plant part arising from that stem
Barb: a short hooked bristle
Basal: leaves located at base of stem, at ground level
Biennial: a plant whose life cycle takes two years to be complete
Binomial system of nomenclature: the plant's botanical name has two parts -- the generic name and the species name (e.g., *Dicentra cucullaria* is commonly called "Dutchman's Breeches", while *D. canadensis* is known as "Squirrel Corn". The Latin name must be underlined or in italics, the first word must be capitalized.)
Blade: the flat expanded part of the leaf
Bog: an area of wet spongy ground (often with peat and some evergreens)
Bract: a reduced or modified leaf sometimes found around the base of flower clusters
Bristly-toothed: leaves having a short bristle at the tip of each tooth
Bulb: underground stem or bud with thick fleshy leaves or scales
Bulblet: a small bulb, growing in a flower cluster
Calyx: outer circle of flower parts, made up of sepals, usually green
Capsule: a dry fruit that splits open at maturity into 2 or more sections
Chlorophyll: green pigment (color) in most plant leaves that absorbs energy from the sun and enables photosynthesis
Clasping leaf: partially surrounding the stem
Cleft: deeply lobed about halfway to mid-vein
Cold frame: a box covered with glass in which to grow plants heated by winter's sun
Corolla: the inner circle of flower parts, made up of petals
Community: a certain set of situations (nutrients, moisture, temperature, light, etc.) that make it possible for a group of unlike plants to exist together successfully
Composite: many flowers arranged in a dense head; many small flowers surrounded by leafy rays (e.g., daisy)
Compound: made up of 2 or more parts
Cordate: heart-shaped (usually regarding the base of a leaf)
Corymb: a flat-topped or convex branched flower cluster in which the branching is usually alternate
Creeping: running along the ground, and rooting as it goes.
Cross-pollination: the transfer of pollen from the anther of one plant to the stigma of another
Cyme: a more or less flat-topped, branched flower cluster in which the branching is usually opposite
Damping Off: a fungal disease causing the stem to close, and plant then dies
Disk: in composite flowers (e.g., daisy) it is the central part of the flowering head
Divided (leaf): cut down to or almost to the base or the midrib

Downy: covered with fine soft hairs
Drupe: a fleshy fruit, usually with only one seed
Egg-shaped: broader at one end than the other, usually 1 1/2 to 2 times longer than wide
Elliptic: broad in the middle, thin on the ends, and 2-3 times as long as wide
Entire: smooth leaf margins with no teeth or divisions or lobes
Family: a group of related plants (divided into genera, which are then divided into species)
Filament: the anther-bearing stalk of a stamen
Flora: the plants of a particular region, habitat or geological period; generally the naturally occurring or native plant life
Flower: the reproductive structure of a seed-bearing plant, usually with showy or colorful parts
Genus (plural: genera): a group of closely related species (it is the first word in the Latin scientific name and is always capitalized and either underlined or in italics)
Germinate: to sprout from seed or spore
Globose: round (like a globe)
Glucose: a sugary food produced by photosynthesis
Grasslands: an area of prairie or meadow grasses, relatively dry most of the year
Habitat: the natural place where a plant grows or an animal lives
Hairy: covered with hairs, fuzzy; used to describe some leaves and stems
Halberd-shaped: arrow-shaped
Head: groups of flowers joined together in a short, dense, terminal cluster
Indigenous: native to a region or area
Indistinguishable: the flower parts are too small to see clearly and identify
Inflorescence: the flower
Introduced: not native to a particular region; exotic
Involucre: two or more bracts below a flower or flower cluster
Irregular: flowers or petals of unequal size or shapes
Joint: the point on a stem where two parts are joined
Lance-shaped (leaf): a leaf that is about 3 or more times longer than it is wide, and broader toward one end, tapering at the other
Leaf: flat green blade attached directly or by a stalk; main organ of photosynthesis or transpiration in higher plants
Leaflet: one segment of a compound leaf
Liana: any of the various long-stemmed woody vines that are rooted in the soil at ground level and use trees, as well as other means of vertical support, to climb up to the top of the tree canopy to get access to well-lit areas of the forest
Linear: long and narrow sides nearly parallel
Lip: the upper or lower part of some irregular flowers
Lobe: a segment, usually rounded, of a leaf or flower
Margin: the outside edge of a leaf
Marsh: a wetland with tall grasses
Midrib: the central vein of a leaf or leaflet
Natives: plants that originated in a particular area or region
Naturalized: not indigenous, but thoroughly established (such as Queen Anne's Lace)
Nectar: the sweet liquid produced by flowers that attract pollinators
Oblong (leaf): longer than broad, with parallel sides
Opposite leaf arrangement: arranged in pairs on the stem

Ovate: egg-shaped
Ovary: the enlarged base of the pistil that produces the seeds
Ovules: the eggs of a plant which (when fertilized) become seeds
Palmate (leaf): leaflets radiate from a central point like the fingers of a hand
Panicle: a branched flower cluster, broadest at base and tapering upwards
Parasite: a plant that gets its food from another living plant
Pedicel: the stalk of a single flower
Perennial: a plant that normally lives more than two years
Perianth: the floral "envelope" (sepals AND petals)
Petal: one of the segments of the corolla
Petiole: the stalk-like part of a leaf
Photosynthesis: the process by which plants use sunlight to convert water and carbon dioxide into glucose that plants need
Pinnate (leaf): divided in such a way that the leaflets are arranged on both sides of a common stalk (like a feather)
Pistil: the central female reproductive part of a flower
Pistillate: having pistils but no stamens
Pod: a dried fruit which splits along the side to release seed
Pollen: the male spores produced by the anther
Pollination: the transfer of pollen from an anther to a stigma
Propagate: to reproduce
Prostrate: lying on the ground instead of growing upright
Pubescent: bearing hairs of any type
Raceme: an elongated flower cluster with stalked flowers arranged along a central stem
Ray: one of the stalks of an umbel; also strap-like or petal-like flowers surrounding disk flower
Recurved: curved downward or backward
Reflexed: abruptly turned downward or backward
Regular: used to describe flowers having all the parts alike in size and shape, such as a daisy
Rhizome: an underground stem that sends up shoots
Rib: a prominent vein of a leaf
Rootstock: a rhizome or underground stem which can be planted below the surface of the soil to produce new above ground growth
Rosette: a circular cluster of leaves, usually at the bottom of a plant
Runner: a slender, prostrate branch
Saprophyte: a plant that gets its food from dead organic matter
Scarify: sanding, nicking, or chipping a hard seed covering, making sure not to touch the seed itself
Sepal: one of the segments of the calyx
Serrate: sharply toothed margin
Sessile: without a petiole or other type of stalk
Simple: flower with all the parts: sepals, petals, stamens and pistils or a leaf which is a single blade
Sheath: a thin membrane surrounding the stem
Smooth: lacking hairs or other protuberances
Spadix: a club-like spike bearing minute flowers, usually enclosed in a spathe, as a skunk cabbage

Spathe: a large bract (leaf-like structure) enclosing a flower cluster or spadix, as a jack-in-the-pulpit
Species: a distinct kind of plant; the second part of the scientific name (in italics, not capitalized)
Spike: an elongated flower cluster with stalkless flowers arranged along a central stem
Spur: a tubular hollow projection on a flower that often holds nectar
Stem: stalk; the rising part of a plant from which leaves, flowers and fruit develop
Stamen: male organ of a flower (consists of the anther and the filament)
Staminate: having stamens but no pistil
Stigma: the pollen-receiving tip of the pistil
Stipule: a small leaf like growth at the base of a leaf stalk
Stratify: cold treatment given to seeds for a given period of time
Style: the stalk of the pistil (connects the stigma to the ovary)
Tendril: a slender, coiling, modified leaf or branch structure used for climbing and support
Terminal: at the end of a branch or a stem
Toothed (leaf): having several small indentations along the margin (as on a steak knife)
Trailing: running along the ground but not rooting
Trifoliate: leaflets arranged in groups of three on a common stem
Tuber: a short, thick, underground stem
Umbel: a flower cluster in which all the flower stalks radiate from the same point (like an umbrella)
Vein: principle framework of a leaf; transports materials such as water and sugars to and from the leaf
Vine: any plant with a growth habit of trailing or climbing stems, lianas or runners
Wetlands: land area saturated with water, either seasonally or permanently, which forms a distinct ecosystem, such as a marsh or bog
Whorled: arranged in a circle around a central point
Wing: a thin, narrow membrane extending along a stem, stalk or other part

USEFUL BOOK RESOURCES

These are useful reference books for this project. A good generalized wildflower identification book is essential for the project; other reference books can be borrowed from your local library or perhaps from relatives and friends. Feel free to use other reputable books that are not on this list.

IDENTIFICATION, GENERAL

M.Archibald, David, *et al.* Quick Key Guide to Wild Flowers, Doubleday, c1968.
Homoya, Michael A. Wildflowers and Ferns of Indiana Forests, IN Univ. Press, c2012.
Kavanaugh, James. Indiana Trees and Wildflowers: A Folding Pocket Guide to Familiar Species, Waterford Press, c2002.
Ladd, Doug. Tallgrass Prairie Wildflowers, Falcon Press, c1995.
National Audubon Society Field Guide to North American Wildflowers, Knopf, c1979, 1997.
Newcomb, Lawrence. Newcomb's Wildflower Guide, Little, Brown and Co., c1977.
Peterson, Roger Tory and McKenny. Wildflowers, NE/NC North America, Houghton-Mifflin, c1996
Petty, Robert O., Anne Petty and Diane Koring. Wild Plants in Flower – Wetlands and Quiet Waters of the Midwest, Indiana Univ. Press, c2005.
Wherry, Edgar T. Wild Flower Guide: Northeastern and Midland U.S., Doubleday, c1948.
Yatskievych, Kay. Field Guide to Indiana Wildflowers, Indiana Univ. Press, c2000.

IDENTIFICATION, SPECIFIC

Antonio, Thomas and Masi. The Sunflower Family in the Upper Midwest, IN Acad. Science, c2001.
Blatchley, W.S. The Indiana Weed Book, Nature Publishing Co., c1930.
Homoya, Michael A. Orchids of Indiana, Indiana Academy of Science, c1993.
Wallman, Norma Bangel. Wildflowers of Holliday Park. Moeller Printing Co., Indpls, c2013.
Weeks, Sally S. and Harmon P. Weeks, Jr. Shrubs and Woody Vines of Indiana and the Midwest. Purdue Univ. Press, 2012.

PROPAGATION

Art, Henry W. A Garden of Wildflowers, Storey Communications, c1986.
Bubel, Nancy. The New Seed Starters Handbook, Rodale, 1988.
Cullina, William. Wildflowers: A Guide to Growing and Propagating Native Flowers of N America, Houghton-Mifflin, c2000.
Cullina, William. Native Trees, Shrubs and Vines: A Guide to Growing and Propagating N. American Woody Plants, Houghton-Mifflin, c2002.
Lewis, Hill. Secrets of Plant Propagation, Storey Communications Inc., c1985.
Reilly, Anne. Park's Success with Seeds, Geo. W. Park Seed Co., c1978.
Rogers, Marc. Saving Seeds: Gardener's Guide to Growing and Saving Veg and Flower Seeds, Storey Communications, c1991.
Williams, Dave. The Prairie in Seed: Identifying Seed bearing Prairie Plants in the Upper Midwest (Burdock Guide), Univ. of Iowa Press, c2010.

Williams, Dave. Tall Grass Prairie Center Guide to Seed and Seedling Identification in the Upper Midwest, Univ. of Iowa Press, c2010.

DRAWING

West, Keith. How to Draw Plants: The Techniques of Botanical Illustration, Timber Press, c1983.

FOLKLORE

Sanders, Jack. Hedgemaids and Fairy Castles: The Lives and Lore of N American Wildflowers, Ragged Mountain Press, c1993.

POLLINATORS

Ohio State Univ. and Xerces Society. Native Bee Identification and Pollination (online)
Opler, Paul and Vichai Malikul. Peterson's Eastern Butterflies, Houghton Mifflin Co., c1998.
Putnam, P. and M. North America's Favorite Butterflies, Willow Creek Press, c1997.
Shull. Ernest M. The Butterflies of Indiana, Indiana Academy of Science, c1987
USDA Forest Service. Bird Pollination (online)
Wright, Amy B. Peterson First Guide to Caterpillars, Houghton Mifflin, c1993.
Xerces Society. Native Pollinators (online)

INVASIVES

Marinelli, Janet and John M. Randall. Weeds of the Global Garden, Brooklyn Botanic Garden Publication, c1996.

LANDSCAPING

Burrell. C. Colston. Native Alternatives to Invasive Plants, Brooklyn Botanic Gardens All-Region Guides, c2007.

Harper, Peter, *et al.* The Natural Garden Book, Fireside Book (Simon and Schuster), c1994.

Harstead, Carolyn. Go Native! Gardening with Native Plants and Wildflowers in the Lower Midwest, Indiana University Press, c1999.

Heileman, Diane. Gardening in the Lower Midwest, Indiana University Press, c1994.

Jackson, Marion T. 101 Trees of Indiana (a field guide), Indiana University Press, c2004.

Johnson, Lady Bird. Wildflowers Across America, Abbeville Press, c1993.

Jones, S.B. and L. E. Foote Gardening with Native Wildflowers, Timber Press, c1990.

Lovejoy, Sharon. Trowel and Error: Over 700 Shortcuts, Tips and Remedies for the Gardener, Workman Publishing, c2003.

Mabe, Rex E. Gardening with Ferns, Potpourri Press, c1973

Phillips, Kathryn. Paradise by Design: Native Plants and the New American Landscape, North Point Press (Farrar, Straus and Giroux), c1998.

Scott, Jane. Field and Forest. Walker and Co., c1984, 1992.

Stein, Sara. Noah's Garden, Houghton Mifflin, c1993.

Stein, Sara. Planting Noah's Garden: Further Adventures in Backyard Ecology, Houghton Mifflin, c1997.

Tekiela, Stan. Trees of Indiana Field Guide, Adventure Publications, c2006.

Weeks, Sally S., Harmon P. Weeks and George R. Parker. Native Trees of the Midwest: Identification, Wildlife Value and Landscaping Use, Purdue Univ. Press, c2006.

USEFUL INTERNET RESOURCES

Search the web for the following organizations (by name) to obtain information useful in completing your projects and record sheets.

1) Check out the following local and nearby Extension Services for information on Indiana wildflowers – identification, growing and landscaping (information usually under horticulture) – Indiana wildflowers inhabit regions that often cross state lines
   a) Purdue University Cooperative Extension
   b) Michigan State University Cooperative Extension
   c) University of Illinois at Urbana-Champaign Cooperative Extension
   d) Ohio State University Cooperative Extension
   e) University of Kentucky Extension
   f) University of Missouri Extension
   g) Penn State University Extension
   h) University of Wisconsin Extension
   i) University of Minnesota Extension
2) Check out databases at the following large botanical gardens which include Indiana in the regions they cover. Be sure to select for our region and local climate. These places often have good identification information.
   a) Missouri Botanical Gardens (identify wildflowers by color, flower structure or leaf)
   b) Chicago Botanical Gardens (ecology and wildlife associated with certain wildflowers, also conservation information)
   c) Lady Bird Johnson Wildflower Center (although located in Texas, they have information on the entire US with wildflowers listed by state or searchable by color, bloom time, leaf arrangement, light requirement or soil moisture)
3) Check out the websites of the following government organizations for information on invasive and naturalized plants and threatened and endangered species.
   a) Plants data base USDA (maps of where each wildflower in the US grows; information on uses for plants; info on which pollinators visit which plants; lists of wetland plants; lists of noxious and introduced plants)
   b) Indiana DNR (endangered plant species)
   c) NRCS Indiana (threatened and endangered species)
   d) US Forest Service Highway Department (Invasive plants, naturalized plants)
4) Illinois Wildflowers (retired horticulture professor Dr. John Hilty maintains a couple of web sites with good information on native vines, grasses, and sedges as well as wildflowers and native pollinators)

4-H WILDFLOWER PROJECT RECORD SHEET, GRADES 10-12

(Do NOT fail to complete this record: It is important to your exhibit)

Name_____Age_____

Name of Club_____Year in Club_____

Township_____ County_____

Date record started_____ Date record completed_____

Signature of leader_____ Date_____

1. Name three plants that grow in Indiana that are invasive:
   a. _____
   b. _____
   c. _____
2. What is the most challenging wildflower you planted? Why was it a challenge? _____
   _____
   _____
3. What are two reasons that loss of native habitat can ultimately impact humans?
   a. _____
      _____
   b. _____
      _____
4. How do Indiana wildflowers assist in preserving biological diversity?
   _____
   _____
   _____
   _____
5. Would you consider studying botany, horticulture or landscape design in the future? _____
   _____
   _____
   _____
6. Community Service Segment (**4-H Club Leader should sign here to verify)**:_____
   I performed a community service at place_____
   on (date)_____under the supervision of_____
   Description of my community service and how long it took me:_____
   _____
   _____
   _____
   _____