PROJECT BASED LEARNING THROUGH DAFFODILS

A suggested curriculum for school-based daffodil planting projects

Many school-based horticulture projects suffer from the fact that most of the intensive work occurs during the summer when children are out of school, therefore non-school entities are necessary to make these projects successful. Bulbs, however, are dormant during the summer, and with planting in the fall and growth and bloom in the spring, lead to better student participation and learning and more successful projects. Such horticultural projects lend themselves well to project based learning, and will allow teachers to develop lesson plans in multiple subject areas at multiple grade levels. The following is a suggested outline for school faculty to use when making specific lesson plans. We have broken the project down into separate phases, and have suggested teaching points for various grade levels. The curriculum lends itself easily to a home school environment.

Project planning:

- The best **location** for daffodils is in an area which will receive full sun during the spring growing period. Have the students help determine which areas on their campus (or home) will be best suited for this (all grade levels). Some factors to be considered in making this decision are:
    - Compass points and angle of sun
    - Locations under trees – which are deciduous and which will be bare in spring
    - Exposure to strong winds in springtime
    - Existence of microclimates where some areas will be warmer or colder than others based on buildings or geological features
- **Coverage** includes calculating the number of bulbs needed to cover a specific area and will be a good way to put mathematical skills to a real-life application.
    - Elementary level **–** have the students calculate the number of bulbs needed to fill a line at either 6 inch or 9 inch intervals
    - Middle/high school – calculate area of plot first and use division to determine number of bulbs needed
    - Proper use of measuring devices can also be a topic for discussion
- **Planting pattern** refers to what arrangement the bulbs will be planted in (all grade levels):
    - Grid

    - Clumps
    - Spacing with other companion plants, if desired
    - More sophisticated designs can also be entertained, such as school logos
        - Art projects
        - Design contests
- Most daffodils grow well in most soils as long as they are well-drained. **Soil testing,** if done, would be most appropriate for high school students to determine if any additions need to be made to the soil. FFA and agricultural programs can be helpful in this regard:
    - Soil testing equipment (corers and transport materials) and instructions are readily available from the county extension office. When submitting the sample, indicate to the extension agent that the planned purpose is for horticulture.
    - When results return, have students read the report to see how their soil sample compares to the suggested soil for the project.
        - Students can use plot area and amount of needed soil amendments to calculate how much amendment to purchase and how to spread it over the plot
    - Even with ideal soil, application of organic matter such as mulch will help to improve soil structure and result in better bloom. The amount needed can be calculated using the plot area.

Planting:

- **Preparation** of the area can be done in a variety of ways using a variety of techniques, as long as:
    - Existing plant material and grasses are removed
    - The top surface of the soil allows for easy digging and bulb placement by the students (all grade levels)
- Non-chemical ways to obtain the above result can be achieved by use of newspaper or black plastic covering the soil, which will kill existing vegetation and smother new growth from seeds. These coverings should be applied in spring and left in place through the summer. The heat generated by the sun will accomplish this.
- **Best time to plant** is when soil temperatures have cooled somewhat, but before the soil freezes. High school students can measure soil temperatures starting around Labor Day and can determine a good time to plant based on their readings.
- On **planting day**, all students regardless of grade level can get involved. Bulbs go in the ground pointed end up, at a depth of three times the size of the bulb (6 inches deep would be about maximum). Equipment which might be helpful would be:
    - Kneeling pads
    - Gloves

    - Garden trowels
    - Appropriate clothing for outdoor work
- Planting day can be a good opportunity for schools to build their community spirit and cohesiveness. Photo opportunities will abound – get everyone involved and don't be afraid to get your hands in the ground!

Maintenance:

- **Weed control** will need to be done at times during the year, however most daffodils emerge before the weeds grow.
- Consider planting a **cover crop** of wildflowers, cosmos or other summer flowering plants to cover the plot during the summer.
- Very important – make sure the plot is **not mowed** before the foliage yellows and dies off. If the foliage is cut off before it yellows, next years' flower will be smaller, and if this process is repeated, the bulbs will die. Middle and high school students may want to do this as an experiment.

Biology:

- Having a ready source of plant material on-site will be very helpful to science instructors as they develop their lesson plans. Students will be able to dig bulbs in various stages of growth, bloom and dormancy, and teachers can develop lessons in accordance with their students' abilities.
- Students will be able to have hands-on identification of:
    - Roots and basal plate
    - Storage organ (bulb)
    - Method of reproduction (bulb offsets)
    - Foliage
    - Stem
    - Petals
    - Sepals
- Students will also be able to identify parts of the flower using hands-on identification skills:
    - Pollen
    - Stamen
    - Pistil
    - Ovary
    - Style
    - Seeds

- Instructors can also remove bulbs at different stages of their life cycle to see how a daffodil grows at different points in the year:
    - Summer – total dormancy
    - Early fall – small root growth
    - Late fall – significant root growth
    - Late winter – full root growth with stem and leaves through ground at surface, waiting to break dormancy
    - Early spring – growing stem and foliage
    - Mid-spring – full bloom
    - Late spring – yellowing foliage approaching dormancy
- Students can also attempt to germinate daffodils from seeds. While germination is relatively easy, getting a bloom from a germinated seed will take 5 to 7 years.
- Students and instructors interested in horticulture can classify unnamed blooms into one of the American Daffodil Societies' divisions based on flower shape and size, and can color code them using the ADS color coding system.

We hope the above narrative is helpful in framing planning and discussion regarding your project based learning efforts. Should you have any questions, please do not hesitate to contact the American Daffodil Society Youth Chairperson, Lisa Kuduk, at lisakuduk@earthlink.net.