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Material from May 21 for Quiz #3 on May 28

Below are the main things discussed on cultural management of weed with an emphasis on irrigation, and weed identification, and our quadrat survey.

Please also review Quiz 1 and Quiz 2.

Weed Adaptation and Cultural Management

1. **What are four factors that determine evapotranspiration in plants?**

   Radiant energy, wind, dryness in the air, and absolute temperature?

2. **Why do South Florida plants often need irrigation?**

   Annual rainfall exceeds evapotranspiration (plant water use), and monthly rainfall exceeds evapotranspiration most months. But March, April, and May are months with a net irrigation deficit, when supplemental irrigation is required to keep shallow rooted plants (those will a small rootzone capacity) supplied with water. There is a clear wet-dry cycle in South Florida. Some plants can survive the wet-dry cycle by defoliation (some native species such as gumbo-limbo) or by having deep roots that can spend water rather than saving water (e.g., some taprooted weeds such as southern sida), while other herbaceous (non-woody) weeds often have a shallow root system and an inadequate soil moisture reserve to survive drought without irrigation.

3. **How does microclimate affect radiant energy?**

   Shade directly reduces radiant energy, which directly reduces evapotranspiration, which reduces net irrigation requirement.

4. **How does wind vary?**

   Typically wind picks up after sunrise, thus evapotranspiration will rise (this can also determine the best times to spray herbicides).

5. **How can an irrigation system vary?**

   Poor precipitation uniformity (the evenness of irrigation) can occur because sprinkler heads are spaced too far apart. During the dry season it may be obvious

from grayish wilted areas that the irrigation system is inefficient.

6. How can water affect dollarweed?

In a large replicated experiment involving dollarweed interplanted with St. Augustinegrass, watering every night for three years resulted in 30% dollarweed coverage, versus 6% from weekly "as needed irrigation," and 2% dollarweed from extreme drought-only irrigation. This confirms the adaptation of dollarweed as a water loving weed and shows the potential for managing dollarweed by reducing the irrigation.

7. How can water affect other weeds?

Weeds other than dollarweed generally were more abundant under drier irrigation regimes.

8. What about other cultural management treatments?

Taller mowing height increased some weeds, and fertilization rate affected the distributions of other weeds, but the effects were not as strong as the effect of irrigation on dollarweed.

9. What was learned?

Irrigation frequency was the most important factor in dollarweed growth. The lowest total weed population (dollarweed + other weeds) occurred in an intermediate treatment, weekly irrigation. No combination of cultural management treatments sufficiently reduced dollarweed in lawns.

10. Are herbicides necessary to reduce dollarweed?

Yes, generally irrigation frequency alone or in combination with other cultural management treatments (fertilization, mowing height) was insufficient to achieve sufficient weed reduction. Subsequently, several sulfonylurea herbicides (a family of herbicides that may replace atrazine in the landscape) were shown to be temporarily effective in reducing dollarweed. The only strong, enduring weed control came from the combination of herbicide plus irrigation managment.

11. What about other turf situations?

A review of multiple studies showed that crabgrasses were reduced in fescue and Kentucky bluegrass lawns by increasing the mowing height or by increasing the N fertilization rate. Some species such as clovers sometimes considered weeds are encouraged by P (phosphorus) fertilization, while a high N:P ratio maintains a higher grass:clover ratio.

In our transect weed survey, we noticed that goosegrass and smutgrass occurred in areas that were highly trafficked. So these species may occur due to traffic and their presence may indicate that an area is prone to traffic.

Weed Identification

12. What is the history of using images to identify plants?

Probably the earliest depiction of plants was in Sumeria in the 4th millennium BC. Pen-and-ink drawings such as in "Selected weeds of the United States" are effective because they remove the plant from the distracting background and they enhance the contrast of diagnostic. In the last 200 years we have gone from the first use of photography to the use of digital photographs that can be emailed and posted on web sites to help identify weeds.

13. What are two common methods of identifying unknown plants?

One method is to thumb through the pages of a handbook, such as the Weeds of Southern Turfgrasses. Another method is to “key out” a specimen using a carefully crafted dichotomous series of comparison steps.

The first method is vague and subjective because it does not have precisely defined quantitative criteria for comparison. The second method has an “either-or” step and can involve explicit quantitative criteria, e.g., “larger than” vs. “smaller than.”

The use of more diagnostically powerful traits in flowers and fruits lends to the use of the second method, the precise description of plants and the use of dichotomous keys. But for the vegetative identification (using only non-sexual plant parts such as leaves, stems, and roots), comparison images may be more suitable because the viewer can psychologically capture the sensory totality of the whole form of the object. This type of sensation is sometimes called the “Gestalt effect.”

14. What are the three type of weeds?

Practitioners (golf course superintendents, farmers, nursery growers, natural resource managers) often artificially group weeds in three groups, the grass weeds (species in the Poaceae or grass family), the sedge weeds (species in the Cyperaceae or sedge family), and the broadleaf weeds (many families, the dicots or dicotyledoneae).

Broadleaf weeds have netted or reticulate venation, whereas grasses and sedges have parallel venation. Grasses have rounds stems and alternate two-ranked leaves, while sedges have somewhat triangular stems and three-ranked leaves.

This artificial classification falls apart in handling some weeds which are monocots (monocotyledoneae) in families such as the Commelinaceae or dayflower family that are neither grass, sedge, nor dicot.

15. What are some of the prominent vegetative features that help identify weeds (make sure you know these terms)?

- **a.** Interpetiolar stipules present or absent
- **b.** Latex present or absent
- **c.** Leave simple and entire, or dissected, or compound
- **d.** Leaves compound pinnate or palmate
- **e.** Leaves cordate (heart-shaped, e.g., Oxalis) or not
- **f.** Leaves linear or not
- **g.** Leaves opposite or alternate
- **h.** Leaves pelate (or not)
- **i.** Leaves shiny or dull
- **j.** Plant hairy or glabrous
- **k.** Plant shiny or dull
- **l.** Rhizomes or stolons present or absent
- **m.** Vines, herbaceous, or shrubs, or trees

16. What are some of the prominent features of flowers or fruits to help identify weeds (make sure you know these terms)?

- **a.** Corolla fused or separate petals
- **b.** Flower arrangement in the inflorescence (spike, raceme, panicle)
- **c.** Fruit type (berry, achene, caryopsis, loment, capsule, samara, etc.)
- **d.** Leaves opposite or alternate
- **e.** Leaves pelate (or not)
- **f.** Leaves shiny or dull
- **g.** Number of stamens, number of styles or stigmas
- **h.** Ovary superior or inferior
- **i.** Petal color
- **j.** Plant hairy or glabrous
- **k.** Plant shiny or dull
- **l.** Rhizomes or stolons present or absent
- **m.** Vines, herbaceous, or shrubs, or trees

Weed Survey

17. We gridded off an area, for what purpose?

The quadrats were used because they made systematic evaluation of weed coverage easier.

18. What was learned?

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