

SEASONAL EFFECTS ON SEED QUALITY OF TWO NATIVE HERBACEOUS PERENNIALS (*DALEA CANDIDA* AND *DALEA PURPUREA*)

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Dalea candida inflorescence



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Dalea purpurea inflorescences

BACKGROUND

Dalea purpurea (purple prairie clover) is a slender erect plant that typically grows to 50 cm in height. Flowers are each about 0.53 cm long, in dense cylindrical spikes at the apex of the stem. Flowers are bright purple-magenta with one large and four smaller petals. *Dalea candida* (white prairie clover) is a close relative of *D. purpurea*, however the flowers are white rather than purple (USDA 2003). Both of these native herbaceous perennials have a potential to be used for landscaping. However, more information is needed regarding the production of these native plants.

Seeds that are produced by the same plant may vary in size, shape and color. Such variations may indicate the germination responses of the seed (Baskin and Baskin 1998). In many species, a number of environmental factors may occur during seed development that can greatly affect the size, shape, and color of seeds. Many plants that are grown in low soil moisture and in high temperature conditions have a low seed yield and seeds that are produced are smaller in size (Baskin and Baskin 1998).

Often seeds that appear to be healthy fail to germinate when subjected to conditions that normally support germination. This response may indicate that the seed has a dormancy preventing the germination of the seed. Seeds from the same parent plant may have different degrees of dormancy. This occurrence is referred to as polymorphism. New seedlings will emerge at different times, reducing competition between plants from the same parent plant. This temporal separation of seed emergence can be advantageous with regard to the survival of the species (Bewley and Black 1994).

OBJECTIVES

- Determine the percentage of fruits that contain seed for *D. candida* and *D. purpurea* in 2002 and 2003
- Examine the variation in germination of plump and dried seeds for both years
- Examine the effect scarification has on the germination of plump *D. candida* seeds collected in 2003

METHODS

Fruits of *Dalea purpurea* were collected 6 September 2002 and 4 September 2003 at Manito Prairie Nature preserve, 6 miles southwest of Pekin, IL. The *Dalea candida* fruits were collected 30 August 2002 and 11 September 2003 at Sweetfern Nature Preserve at the east edge of Hopkins Park, IL.

The number of fruits that contained a seed was determined by rubbing the fruit between my fingertips until the seed was exposed (25 fruits per rep, 8 reps). Seeds were divided into two groups, plump and dried, based on visual characteristics.

Plump and dried seeds (not scarified) from each year for each species were used for the germination study (25 seeds per rep, 3 reps). Plump *D. candida* seeds collected in 2003 were scarified using concentrated H₂SO₄ for 30 minutes followed by a distilled water rinse. Germination was determined by placing seeds into Petri dishes on moist filter paper, and then into a germination chamber at 25°C and 12 hour photoperiod. Seeds were considered to germinate when the radicle emerged. Seed that did not germinate and were not covered with fungi were tested for viability using a 1% solution of 2,3,5-triphenyl-tetrazolium chloride (TTC). Seeds were considered viable if more than 50% of their surface turned pink. Data were analyzed using an ANOVA followed by mean separation tests (Duncan's multiple range test) at 5% level where applicable. Means and standard errors also were calculated.

RESULTS

Table 1: Percentage of Fruits Containing Seed

| | <i>Dalea candida</i> | | <i>Dalea purpurea</i> | |
|-------------|----------------------|--------------|-----------------------|-------------|
| | 2002 | 2003 | 2002 | 2003 |
| Plump Seeds | 18.5 ± 2.0* a‡ | 12.5 ± 2.7 a | 23.0 ± 2.4 a | 1.5 ± 0.7 b |
| Dried Seeds | 7.0 ± 1.0 a | 2.0 ± 0.8 b | 11.5 ± 3.1 a | 7.5 ± 2.8 a |
| Total Seeds | 25.5 ± 2.3 a | 14.5 ± 2.4 b | 34.5 ± 4.3 a | 9.0 ± 2.6 b |

* means ± standard errors
‡ means within a row followed by a different letter are significantly different based upon ANOVA at 5% level

The percentage of *D. candida* and *D. purpurea* fruits collected in 2002 that contained seed was significantly higher than the percentage of fruits collected in 2003 that contained seed.

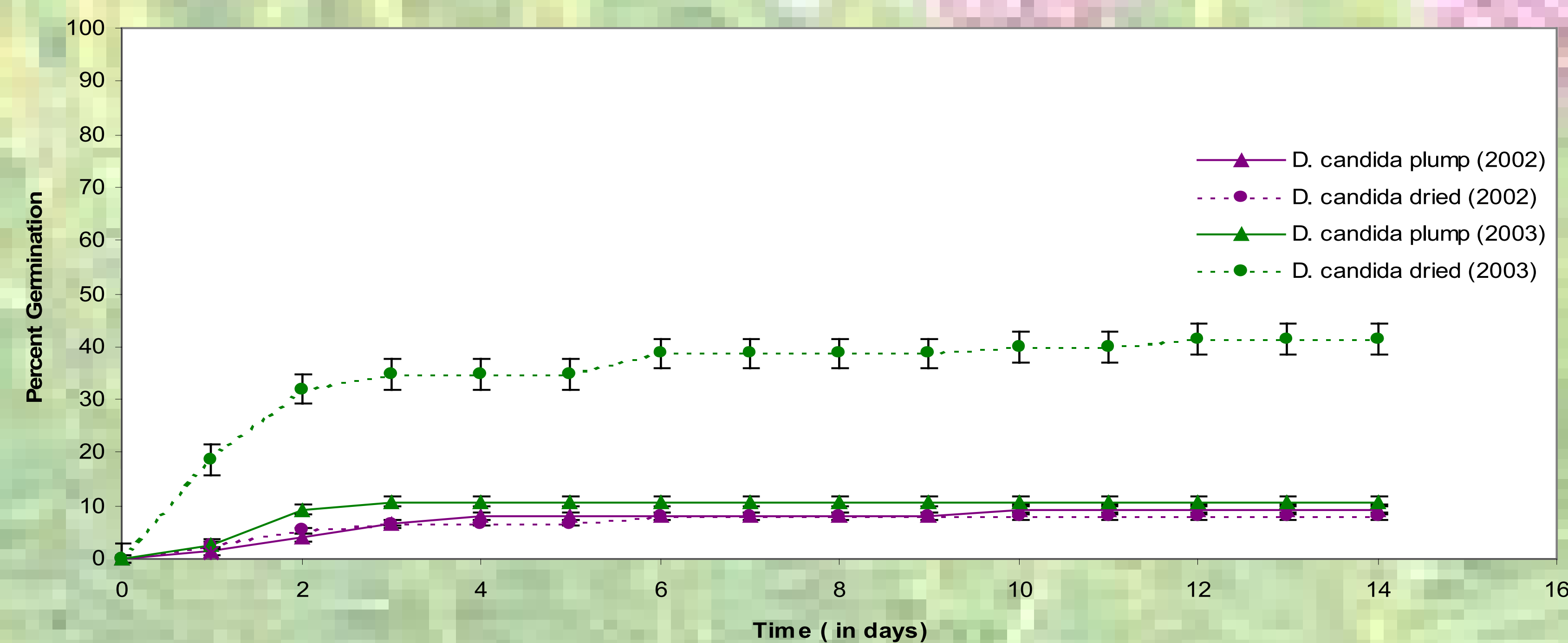


Figure 1: *Dalea candida* - Percent Germination for Seeds (Not Scarified) Collected in Different Years

No significant difference was found between the plump *D. candida* seeds collected in 2002 and 2003 in regards to percent germination. However, the dried seeds collected in 2003 showed a significantly higher percent germination than the dried seeds collected in 2002.

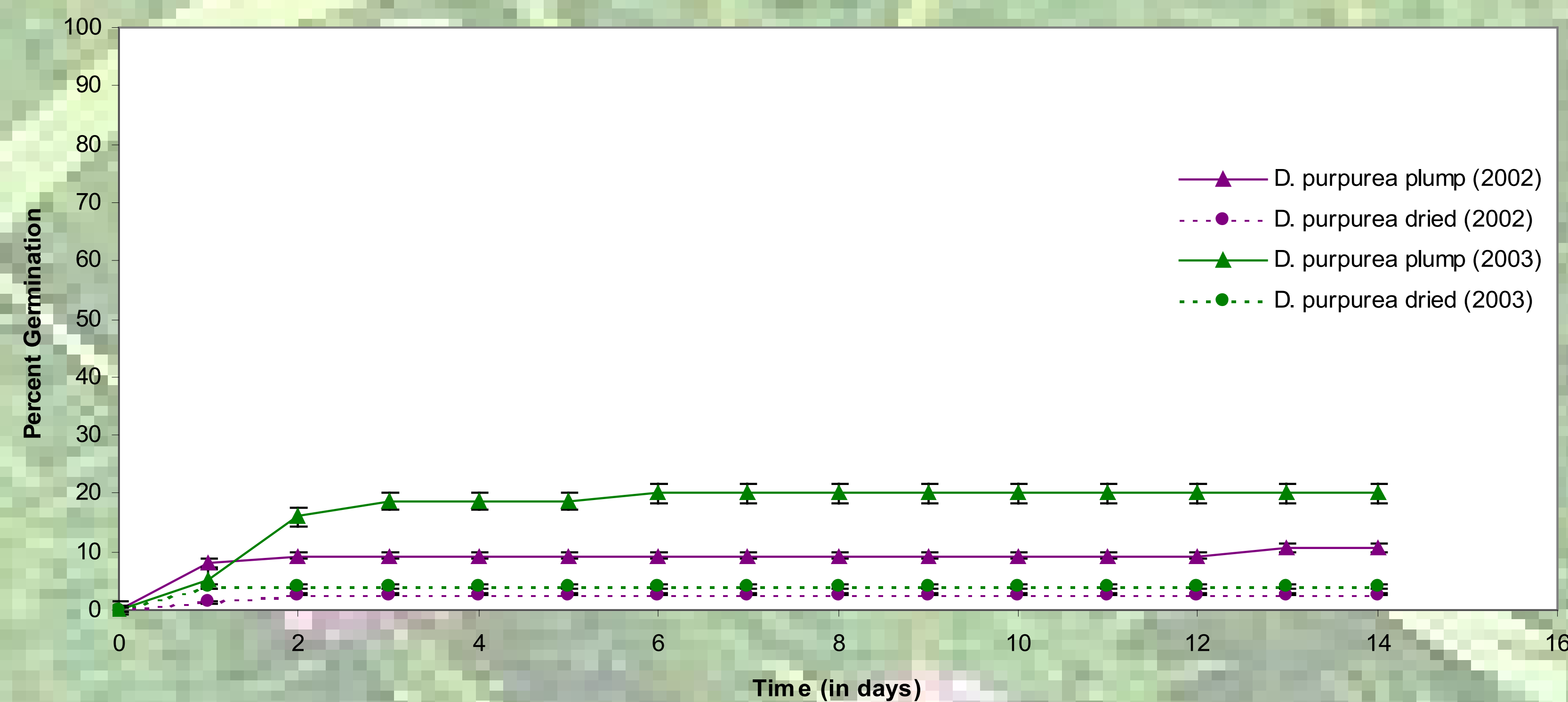


Figure 2: *Dalea purpurea* - Percent Germination for Seeds (Not Scarified) Collected in Different Years

The percent germination of plump *D. purpurea* seeds collected in 2002 did not differ significantly from those collected in 2003. The dried *D. purpurea* seeds collected in 2002 also did not differ significantly from those collected in 2003.

DISCUSSION

In both species, the fruits collected in 2002 contained a significantly greater percentage of seeds. *Dalea candida* fruits collected in 2003 contained a significantly smaller number of dried seeds than the fruits collected in 2002. These findings may indicate that the environmental conditions when the seeds developed were drier, contributing to their darker more desiccated appearance. Less suitable growing conditions in 2003 would also account for the significantly lower number of plump *Dalea purpurea* seeds collected in 2003. Since fruits were obtained from the same population of plants at approximately the same time of year, it is reasonable to attribute the differences in seed production to environmental factors.

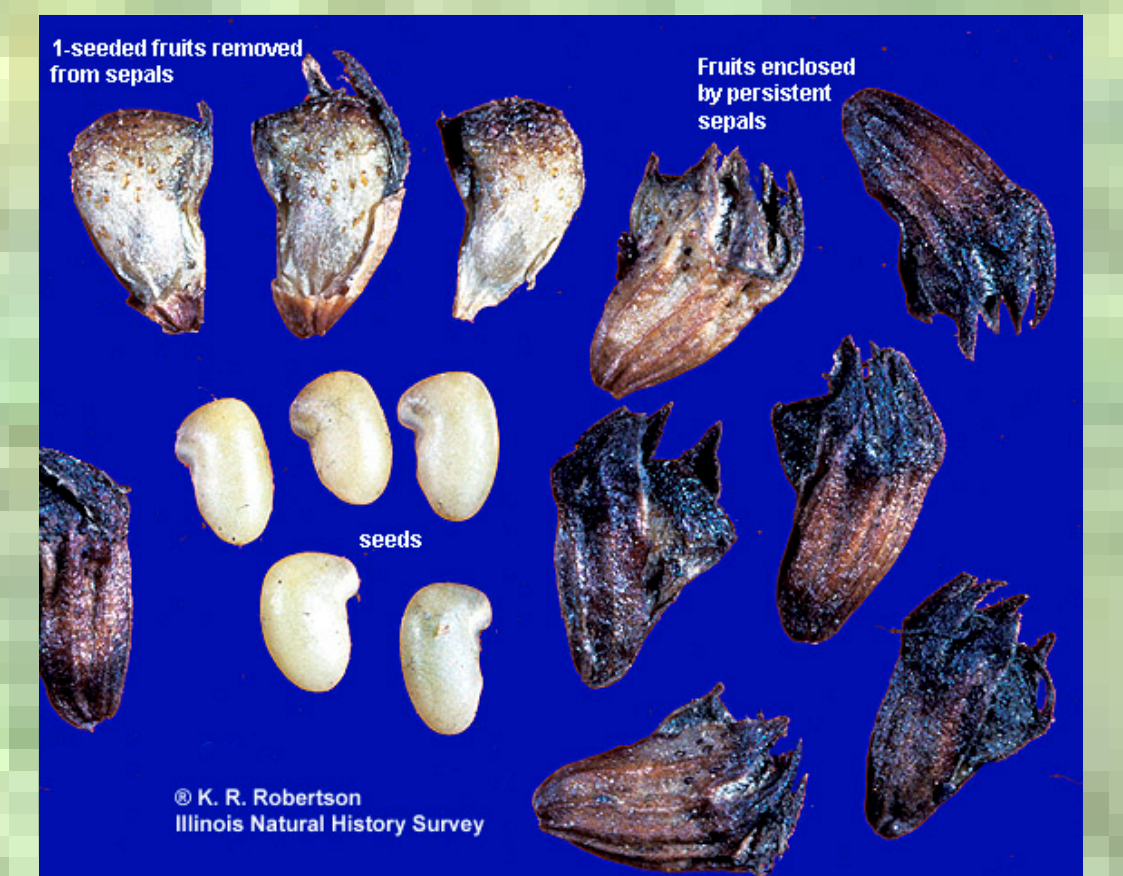
Percent germination for the three groups of *D. candida* seeds (plump scarified, plump not scarified, and dried) collected in 2003 showed a significant difference between the groups. The plump, not scarified seeds showed the lowest germination (10.7%) while the plump, scarified seeds showed the highest germination (94.7%). Germination of plump *D. candida* and *D. purpurea* seeds collected in 2002 did not differ significantly from those collected in 2003. The plump seeds that did not germinate had a very hard seed coat and were quite dry even after being in the moist environment for two weeks. The dried seeds may have been able to imbibe water because their seed coat was broken. The tetrazolium test indicated that all plump seeds that did not germinate were viable. These results indicate that dormancy must be broken in order for the seeds to germinate.

IMPLICATIONS

- *D. candida* and *D. purpurea* seeds were more abundant in 2002 than in 2003
- Percent germination in plump, not scarified seeds was the same in 2002 and 2003 for both species
- Percent germination in dried, not scarified seeds was different in 2002 and 2003 for *D. candida*
- Plump *D. candida* seeds have a higher percent germination when scarified than not



Dalea purpurea fruit inflorescences



Dalea spp. fruits and seeds

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ACKNOWLEDGEMENTS

Dr. John Ebinger, Dr. Ken Robertson, Undergraduate Research Council at EIU, Illinois Council on Food and Agricultural Research, Department of Biological Sciences

