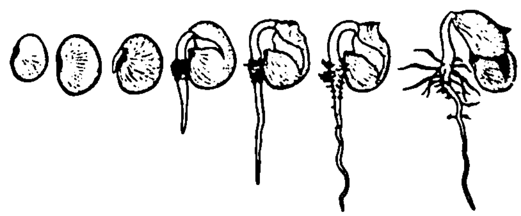
NATIVE PLANT SOCIETY OF NEW MEXICO
February 1979 Newsletter

February meetings: On Wednesday, February 21st, Alex Wilson, Workshop Program Coordinator for the New Mexico Solar Energy Association, will be giving a slide presentation on attached solar greenhouses. Theory, design, operation and construction of solar greenhouses will be covered as well as a brief introduction to solar greenhouse management. The session will be informal with plenty of time for questions and discussion. It is hoped that members will come with specifications, problems and experiences with greenhouse building and operation to share. We will meet in Room 118 of the Laboratory Bldg. at St. John's College, 7:30 p.m.

The Las Cruces Chapter has decided to begin meeting on the second Wednesday of each month in Room 156 of the Agriculture Bldg. at NMSU (7:30 p.m.). Get acquainted with your new chapter president, Bob Reeves, and talk about plants, Wednesday, February 14th. Some slides will be shown and questions answered.



The Phenomenon of Dormancy and Some Techniques to Induce Seed Germination*

Some seeds germinate over a wide range of temperatures and only need water and oxygen to grow. Many of these ready-germinators are cultivated plants because man has acted as the selective agent. Biennial and perrenial plants, however, are generally not rapid germinators. Then there are "intermittent germinators" which need some kind of special combination of environmental factors to germinate.

Dormancy may be thought of as a type of senescence or inactive state, first attained during seed set as the protoplasm thickens, which allows a seed to pass through unfavorable conditions. In part, it protects the seed from germinating before it reaches the ground. Dormancy ends when environmental conditions improve or when treatments applied alter the seedcoat chemistry. The presence of abscisic acid is known to be associated with dormancy.

Mechanisms for breaking dormancy include:

1. Light. Deep burial, which reduces light and oxygen supply, can promote dormancy, the effects of which may be seen in disturbed areas.

2. Scarification. One of our biggest inhibitors in dealing with native New Mexican plants in a thick, dense seedcoat. This adaptation avoids the possibility of rapid dessication under our semi-arid conditions. In nature, seeds get blown against abrasive surfaces for mechanical scarification or eaten by birds to receive an acid scarification. If it is suspected that the seedcoat provides

*Notes taken from a lecture by David G. Sabo, Environmental Coordinator for the Public Service Co. of New Mexico, speaking at our January meeting.

some kind of structural or inhibitory block, the seed may be placed in a mechanical scarifier (i.e. a fan which blows the seed against coarse sandpaper). If it is favored by birds or animals, it probably needs an acid scarification, so try a sulphuric acid treatment. Habitat and the physical appearance of the seedcoat often dictates what to do. With most species of the aster family (Compositae), some type of manipulation of the seedcoat is obvious. Legumes and the Malvasia have an impermeable seedcoat that often need only a little scarification to get the moisture in. Cliff rose, Cowania mexicana, has a very thick seedcoat and small embryo which can easily be destroyed by filing. Stratify this species at 14 degrees C. for 30 days and it germinates readily. Mirabilis multiflora, Ipomea spp. and buckeyes need scarification too. The seed of Atriplex convertifolia and Castelleja integra are known to have a symbiotic relationship with a soil fungus that eats through the seedcoat.

3. Low-temperature stratification. Holding a moist seed at 0-5 degrees C. for a period of time can break dormancy. See the report on Penstemons by R.J. Crump in the July 1978 newsletter (NPS).

4. Diurnal temperature alterations. Research into this area has been greatly assisted by the use of a thermogradient plate, which allows one to test different temperature combinations simultaneously. Temperature is regulated by the flow of hot and cold water baths in an enclosed system across a thick, aluminum plate. The hot side of the plate has to be elevated to get a uniform 2.5 degree C. break between each row and can also be rotated to simulate diurnal temperature changes. This equipment, though expensive, offers the opportunity to test 64 petri dishes with different temperature regimes, each of which can be divided into four parts (quatrapetris) giving four replications. Antifreeze may be added to the cold water bath effecting a low-temperature stratification treatment. This freezing/thawing action causes the seedcoat to fissure, as in nature.

5. High nitrates in the presence of light. These spring-like conditions are thought to be associated with germination of some annual species, such as Chenopodium album. Nitrogen compounds like potassium nitrate can sometimes take the place of light.

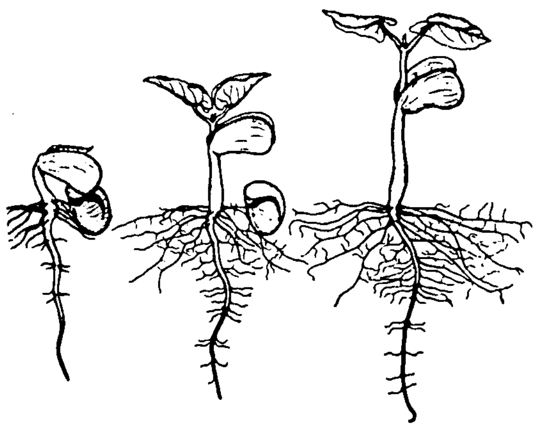
6. Gibberellic acid and cytokinens. These hormones dissolved in water have been successfully used to break dormancy. Ethylene gas, found in flooded or compacted soils, and carbon dioxide are also known to promote germination.

7. Fire. Some chapparell species depend on scarification of the seedcoat by fire.

Mr. Sabo, funded by a grant from the U.S. Forest Service, was looking for plants that could be used to stabilize soil in the strip mine areas of northwestern New Mexico. The wide ecotypic variation observed in most species, however, made general recommendations difficult. For instance, with Artemesia tridentata, subspecies vasia, stratification was not found to be necessary, contrary to the published literature. Differences between subspecies of Chrysothamnus nauseosus were also described; with some there is no seedcoat, just a papery layer. So not all populations of big sage or chamisa are useful for stabilizing soils.

Dave was also studying light/temperature/water interactions on the 25 native species designated by the Forest Service. With each species he started with four populations on the first run and selected the best germinating population for his graduate research. Most of the species studied had a fairly high germination rate of over 60 percent. If a wild population is limited by light, then light may actually retard seed germination in these ecotypes. Sporobolus eroides, Alkali sakatone, exhibits this behavior. Other variables in climate contribute to the complexity of germination research. Light/temperature interactions can sometimes be explained by the simple fact that cooler temperatures will preserve the seed longer. Age of seed is definitely a factor affecting dormancy, and it is often difficult to control this variable. The life of a seed may vary from a few days to over 1,000 years.

The native plants of New Mexico, then, can be grouped into two broad categories which can aid gardeners in scheduling planting times: 1) those that require stratification are planted mid-winter; and 2) those that require a specific moisture/temperature regime are planted in mid-summer so that they catch the summer rains. Low-temperature stratification is designed to simulate fall/winter/spring temperature changes needed by group #1. For the second group, a specific combination of diurnal temperature changes may be involved, as with wheatgrass, Agropyron smithii, which requires 8 hours at 18.5 degrees C. and 16 hours at 10 degrees C. to germinate, regardless of ecotype. Sometimes an inhibitor is active only above a certain temperature, so leaching is required when it is warm, as is true of many of our desert annuals.



Although edaphic factors can have an important effect on the germination of some species, David uses successfully a mixture of humus and sand for seed propogation in his greenhouse at Corrales, New Mexico. His paper written in conjunction with Warren Wagner on "Germination Characteristics of Various Species of Semi-Arid Plants" will be out soon. In the meantime, copies of their recommendations for optimum germination of certain species of native grasses and shrubs can be obtained by writing to the editor, Rt. 4, Puesta del Sol, Santa Fe, New Mexico 87501. Thanks again, David.

Announcement: Dr. Stephen S. Talbot has joined the Albuquerque office of the U.S. Fish and Wildlife Service to work on endangered plants.

Membership: Join the Native Plant Society of New Mexico by writing Carol Dimeff, Rt. 4, Puesta del Sol, Santa Fe, New Mexico 87501. Dues are $6.00 per person or $8.00 for family memberships, a tax deductible contribution to a non-profit organization (if you itemize). Membership entitles you to receive our monthly newsletters and to learn about our meetings, field trips and plant sales. One third of your dues is forwarded to your chapter. If you are already a member but have not renewed your dues in the last six months, we ask that you please submit dues for the calendar year 1979. Our membership is getting too big now to continue our old policy of "pay as you go". If your budget is very tight, request a partial refund of your '78 dues and we'll be happy to accommodate you.

Booklets: Our revised publication, Native Plants for Landscaping in Northern New Mexico, including the 8-page supplement, is just 75¢ plus 40¢ postage on each booklet. The southern version, Native Plants for Landscaping in Southern New Mexico, is also available at the same price by writing to the editors, c/o Rt. 4, Puesta del Sol, Santa Fe, New Mexico 87501.

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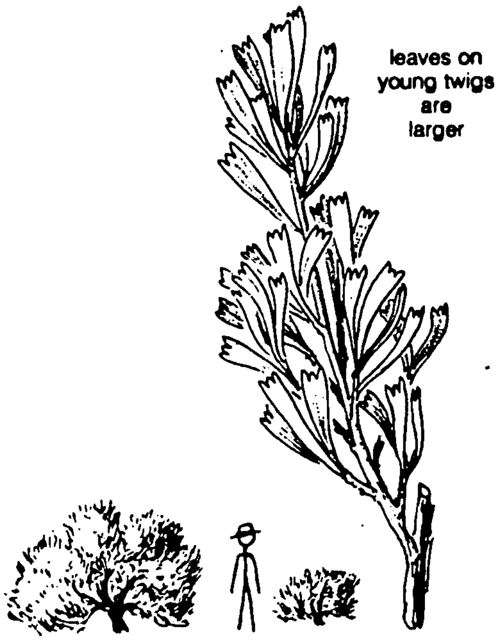

Big Sage
<u>Artemesia tridentata</u>