



TECHNICAL BULLETIN 03-1

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May 5, 2004

SUBJECT: Native Seed Collection and Handling

A minimum of 2 years should be allowed for the seed collection phase. Ideally, seed collection should be initiated during the planning stages of a project.

Seed production of native species is unpredictable. Inability to collect indigenous materials will delay the revegetation efforts or force the park to use non indigenous locally collected ecotypes or cultivars.

STEPS:

1. Identification

- Species and seed collection areas.
- Research species for estimated flowering time and seed maturity. Become familiar with the seed location, appearance, size and shape.
- Research species for special problems such as:
 - Tendency to shatter (may have to lay out tarps to ensure against loss)
 - Subject to predation from birds, rodents etc. (may have to bag or fence)
 - Frequency of seed production. Not all species produce seed each year.
 - Subject to disease and insects. This will affect quantity and quality of seed.

2. Monitoring

The timing of seed collection is one of the most crucial and difficult steps in the process of collecting seed. Collection of immature seed results in low seed viability or dormancy.

The window of opportunity to collect seeds of some species before ripening and shattering may be very narrow. Therefore, monitoring must be given the highest priority or the window to collect the highest seed quality and quantity will be closed until the next season. The next years seed quality/quantity may be better, worse or non existent.

- Species must be checked weekly after bloom for maturity and fill. Depending on the specie, environmental conditions etc, the period from bloom to maturity could be from three to six weeks.
- Maturity depends on many factors- species, ecotype, site -degree of slope exposure/orientation, soil moisture, temperature (extremes of hot or cold).
- Fill depends on conditions at time of pollination and seed fill period, soil moisture, insects and animal depredation.

- Stages of maturity

- Milk - This stage is indicated by a milky liquid that is excreted when the developing seed unit is squeezed. Seed collected at this stage will not fully develop or mature.
- Soft dough - Seed at this will produce a soft doughy, sometimes milky substance when squeezed. Seed collected at this stage will normally not germinate or will have poor seedling development and survival
- Hard dough - This stage can be judged by pinching the seed between fingernails. The seed will be firm, but not hard and capable of denting or breaking with fingernails. Seed collected at this stage should develop to be fully mature and viable. Species that shatter seed quickly at maturity should be collected at this time.
- Mature - At this stage the seed will be hard, will not dent and in some cases may require a knife to cut open. Try biting it; if it is too hard to bite, or crunches when bitten, it is at full mature stage.

Method

- Pick off single seed unit. Squeeze out seed caryopsis between finger nails to check stages of maturity, or rub out seed head between finger and palm of hand to reduce the seed head to single seed unit then check maturity stage.
- If unsure of maturity, periodically send seed, via overnight mail, to an experienced individual, such as and NRCS Plant Materials Center. This arrangement should be set up in advance so samples will be analyzed immediately upon receipt.

3. Collection

Increase diversity.

- Do not collect all seed of one species at one time. Vary the location and collect several times throughout the seed production period. This will ensure that early, middle and late maturing plants will allow the plant population to be more "plastic" and capable of responding to variable site weather/climatic conditions.
- Do not collect seed only from the tall robust heavy seed producing plant phenotypes. Some wild populations will contain individuals of differing appearance. Try to collect a representative sample of all healthy phenotypes (tall, short, robust, and delicate).

Methods

Grasses-

- Seeds of grasses can often be collected by stripping. The process consists of allowing the grass stems to collect between the fingers and the seeds pulled from the terminal inflorescence as your hand moves forward. Another method is to gather the inflorescence of the plant together and cut off the stem just below the seed head.

Forbs and shrubs-

- The broadleaf species are more difficult to collect than grasses. The seeds of many forbs can be collected by holding a tray or box under the inflorescence while shaking or flailing the mature seeds into the receptacle.

For the very small stature, small seeded forbs, the simplest method may be to cut off the entire inflorescence or plant and place in bags.

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- Herbaceous species with pods or other capsules (such as lupines) or other fruits that explode and throw the seed, are especially difficult to collect. The best method is to collect the fruits while they are immature and allow them to ripen in closed bags. Another option may be to bag the entire plant or inflorescence in the field.
 - Shrub species can be collected by holding a tray or box under the branches while flailing the bush with a stick or paddle
- Collect 2-3 times the amount of seed actually needed to compensate for poor seed fill, loss during, drying, processing, testing etc.
 - Place seed in a breathable container such as paper or cloth sacks – **not plastic!**
 - Label with species and collection location
 - Place the opened bags in a warm, dry, well ventilated location i.e. window ledge, greenhouse bench etc. until the seeds are fully mature and dry. Check periodically; do not allow them to become overly hot or dry.
 - Monitor the seed for proper drying and insect activity. Often forb and legume species have seed insects associated with them that can completely destroy seed in a very short time. The bag of seed should be treated or a No-Pest strip inserted at the first indication that insects are present.

4. Processing/ testing

- Hand rub, thresh out and separate clean seed from inert material by hand and air draft. Or arrange for the seed to be processed by professional seed cleaners such as an NRCS Plant Materials Center.
- Send sample to seed testing lab for germination and purity tests (allow 6 weeks for results). An alternative would be a tetrazolium test which can be completed within 48 hours and will determine the viability of the seed. The seed will still need to be tested for purity. The combination of percent purity and germination is necessary to determine PLS and the proper seeding rate.

5. Seed Storage

Proper seed storage is a vital step in the seed collection process to guarantee viable seed. The two major concerns in storing seed are temperature and moisture. Two rules of thumb that relate to the influence of moisture and temperature are: 1) each 1% reduction in seed moisture doubles the life of the seed and 2) each 10 degreeF reduction in seed temperature doubles the life of the seed.

If seed moisture is high enough (above 30%), nondormant seed will germinate. From about 18 to 30%, heating due to microbial activity will occur if oxygen is present, resulting in rapid death of the seed. From about 10% seed moisture of oily seeds and about 13-18% for starchy seeds, storage fungi grow actively and destroy the seed embryo. Therefore, seed should be stored below this moisture content at all times.

However, drying to below 4-5% seed moisture will also result in more rapid deterioration than if seed is dried to a range of 6-10%. To dry seeds, the relative humidity of the air must be below the equilibrium with seed moisture so there will be a moisture gradient from the seed to the air. Seeds can be dried in heated or unheated air, but in most cases unheated air will not be effective in producing a safe moisture content. Therefore, heated air is most commonly used with an air temperature not to exceed 100° F. There should be good air flow around the seed and it is critical not to dry the seed too rapidly.

After seeds are dried to the desired moisture content, they must be kept at this level or the cost and benefit of drying the seed are lost. Maintaining the seed in a dry condition can be done by: 1) the storage unit is made moisture proof and has dehumidification equipment or 2) the seeds may be stored in moisture proof containers.

If these conditions cannot be obtained at a park facility. Make arrangements with a local seed facility, university, or NRCS Plant Materials Center.

References:

Glacier NP Seed Collection Guide – Contact Joyce Lapp 406-888-7817
Grand Canyon NP Revege Manual – See Manual and/or contact Lori Makarick 928-638-7857. Proceedings of the NPS Revegetation and Reclamation Training 928-638-7858. Workshop 9/29-30/1993.
NRCS PMCs . See <http://Plant-Materials.nrcs.usda.gov> for the PMC that services your area.