Common Difficulties Encountered in Collecting Native Seed

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Abstract—The increased demand for native seed has surpassed our ability to provide high quality range-collected seed. This paper discusses some of the hazards and common mistakes associated with the collection of wildland native seed. Among the common difficulties in collecting native seed are: (1) native species do not produce seed often in the arid West; (2) there is a scarcity of large homogeneous accessible stands of native plants; (3) a widespread occurrence of noxious weeds lowers the percent of seed purity; and (4) fire has reduced the availability of native shrubs. Environmental factors that may be hazardous to native seed collection include late frosts, hail, competitive grazing, and wind. Collection practices that can improve changes of success include: (1) management of moisture content of collected seed; (2) proper bagging of seed and protection from the elements; and (3) proper seed cleaning with minimal damage.

The increased demand for native seed has surpassed our ability to provide high quality range-collected seed. Frequently, the demand for seed arises in an atmosphere insulated from the realities and risks inherent in wildland collecting. Current Conservation Reserve Program seeding specifications, which recommend or require the use of species not available in the market, indicate a need for better understanding of the processes by which native seeds become available. Successful collecting of native seed requires favorable environmental conditions, some expertise, patience, and much luck. This paper discusses some of the hazards and common mistakes associated with the collection and conditioning of wildland native seeds.

In the arid West, the first and foremost cause of collection difficulty is that most native species do not produce seed very often. Many desert species produce good seed only once every 10 to 20 years. This is not only due to absence of rainfall but also because soils frequently lack the necessary nutrients to promote seed production. Therefore, much of the seed available on the market represents rare, opportunistic collections that cannot be anticipated or duplicated with any regularity. Where demand for certain seeds is stable and substantial, field cultivation of species is beginning to meet market demands. It takes approximately a decade of trials before field production of natives to become economically feasible.

The second factor limiting collection is the scarcity of large, homogeneous, flat, accessible stands of natives. Western reclamation customers demand high-purity, high-germination seed of individual species with very little weed or other crop species present. It is common for collectors from several states to converge on a good patch of seed.

An increasingly important hazard to native collecting is the widespread occurrence of noxious weeds. Many former collecting areas are avoided by conscientious collectors because the risk of noxious weed contamination is too high. Particularly, riparian plants such as snowberry (*Symphoricarpos albus*) are rapidly becoming intermingled with knapweed species that produce seed borne on parachutes that float in the air until they "hang-up" in neighboring foliage. Even general proximity of noxious weeds creates large risks.

Fire has taken its toll on the availability of native shrubs in the West. Due to the association between fire and cheatgrass *(Bromus tectorum*), millions of acres have become cheatgrass deserts with few forbs or shrubs remaining. This trend appears to be accelerating, especially on the Snake River Plain and in the Great Basin.

Other environmental factors that make native seed collecting risky include late frosts, hail, competitive grazing, and wind. Many natives have physiological characteristics that increase harvest difficulty or reduce yields. Seed shattering in species such as needle grasses (*Stipa* sp.) reduces the harvest window to only 2 or 3 days before the seed falls to the ground. Timing and good weather become crucial for success, and the temptation to harvest immature seed before it drops is great. Indeterminance is another factor that can greatly reduce yield or quality. For many species, only a small percent of seed may ripen at a given time—often as little as 5 to 10 percent of the potential seed on a plant. Usually, wind carries away the ripened seed before more seed can mature; only a small percent of potential seed is harvested, and much of what is harvested is immature.

Collection practices can significantly enhance chances of success. The most common pitfall for both novice and experienced collectors is the management of moisture content in collected seed. Excess moisture can cause seed to heat up and die within 24 hours if not properly treated. In general, the vegetative material containing seed must be dried before damage occurs. Frequently this entails laying seed out on tarps to dry at the collection site, and constantly guarding the seed against damage from rainfall or from feathered and four-footed opportunists. Care should be made to avoid windy sites and land features that could flood in a thunderstorm. Tarps should be free from holes and secured quickly when weather threatens. Because tarps cause heat build-up very quickly, they should be rolled back soon after a storm passes. The greatest drawback to using tarps on the range is puddling. No matter how careful you are, some water will penetrate your defenses, and then tarps must be checked to remove puddles from beneath the drying seed pile.

Proper bagging and protection from the elements become the major concerns once seed is dry enough to transport. The

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need to move to other jobs quickly rarely allows for full seed-drying in the field. This leads to a very common mistake among collectors who drop off bags of partially dried seed in warehouses for storage until time can be made to further dry or clean the seed. A moisture content above 15 percent, but below the moisture necessary for heating, can seriously injure seed if left in that condition for months or even just weeks.

Assuming the successful completion of all these steps, the last major hurdle awaiting the unwary is seed cleaning damage. Many seeds are delicate and can be damaged by the improper application of horsepower and steel. Grinders and hammermills are especially efficient at destroying seed quickly and must be either mastered or avoided. Proper seed cleaning machinery such as fanning mills, aspirators and gravity separators are essential for successful seed cleaning. Frequently, seed characteristics obstruct our attempts to achieve high purity. Many shrubs, such as rabbitbrush (*Chrysothamnus* sp.), are cleaned only to about 20 percent purity due to size or flowability characteristics that cleaning machinery cannot address. Native seeds tend to vary in size and shape more than common grains, for which most cleaning machine are built. Frequently, homemade solutions are better than off-the-shelf technology.

Only when a seed lab analysis is completed at the end of cleaning do you know if you have a saleable lot of seed. It is unconscionable to sell or trade untested seed. The eye cannot tell if seed is alive or dead; also, the untrained eye can easily overlook the presence of noxious weed seeds. A certified third-party seed lab can give both buyer and seller reasonable assurance of seed quality.

But the risks don't end at this point. All seeds eventually die, and some seeds, such as Wyoming big sagebrush, (*Artemisia tridentata wyomingensis*), can die within weeks or months of collection. Seed collected during poor seed years tends to be lighter, more insect damaged, and lower in viability and longevity than seed collected during good years. Because of dropping germination in certain seed lots, we take $5,000 to $10,000 worth of seed a year to the dump.

With an understanding of the seed harvesting chain of events, its limitations and risks, buyers and regulators can better understand the difference between what is possible and what is not possible. We can improve restoration success when expectations are consistent with reality. Any divergence between the two can lead to confusion and dissatisfaction.

It is important for buyers and regulators to understand that it may take many years of wishing before some native species become available. Projects requiring unusual seed should be planned far enough in advance to assure availability. Seed suppliers should be consulted regularly during planning stages. Even regularly available seeds can become exceedingly expensive if large and unexpected demand arises. Finally, if wildland collected seed seems expensive or erratically available, buyers should understand the risk, luck, and skill required to collect a high quality product.