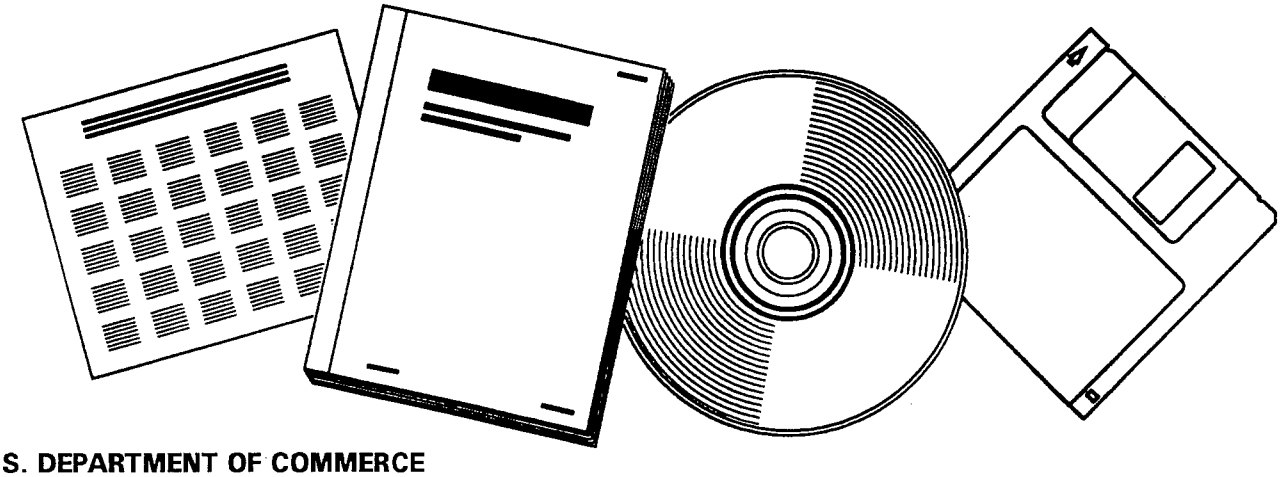
PB98-118680

PARTNERSHIP FOR WILDLIFE GRANT NATIVE PLANT SEED PROGRAM

19 JUN 97



U.S. DEPARTMENT OF COMMERCE
National Technical Information Service

Final Report

submitted to the U.S. Fish and Wildlife Service

Partnership for Wildlife Grant

Native Plant Seed Program

June 19, 1997

Prepared by
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Natural Areas Section
Bureau of Endangered Resources
Wisconsin Department of Natural Resources

INTRODUCTION AND BACKGROUND:

In 1995, the Department of Natural Resources (DNR) received a Partnership for Wildlife Grant for the Native Plant Seed Program. The grant period was from November 1994 through December 1996.

This goal of the Native Plant Seed Program is to establish nursery beds to provide seed for Department lands, Department of Transportation (DOT) roadsides, and also for the private nurseries. Providing Foundation Seed stimulates the growth of the private nurseries.

RESULTS:

Seed Collecting Applications:

An "APPLICATION AND PERMIT FOR COLLECTING SEED ON DEPARTMENT OF NATURAL RESOURCES LAND" was prepared (figure 1). This permit was prepared to assist the private sector in acquiring Foundation Seed and for non-profit conservation organizations or government agencies to collect seed for their restorations. Species lists were complied from file information for 41 State Natural Areas. These lists assisted collectors in locating selected species.

In 1995, 16 permits were issued to 9 private nurseries (PN) and 7 conservation organizations/government agencies (CO/A). In 1996, 14 permits were issued to 7 PN and 7 CO/A.

Seed was collected from 56 sites in 1995. The majority of collecting sites were State Natural Areas located on Department land. Seventy four species and 154 pounds (PN-145 pounds and CO/A-9 pounds) of forbs were collected. Eleven species and 435 pounds (PN-385 pounds and CO/A-50 pounds) of grass were collected. Results for 1996 have not been processed but the collecting effort appears similar to 1995.

Seed Cleaning Handbook

A 94 page handbook on how to use the seed cleaning equipment (hammermill and fanning mill) was written and copies were distributed (figure 2). The handbook also includes individual cleaning requirements for 79 species.

Planting Rate Recommendations

A handout on Planting Rate Recommendations for Wildlife Plantings was prepared (figure 3).

Seed Certification

The Department coordinated efforts to establish state-wide certification standards for 7 grasses and 32 forbs (figure 4). The certification program will allow private and public buyers of seed to obtain seed of a known genetic origin, and of known purity and germination. More importantly this program is using Wisconsin genotype seed which is better adapted to Wisconsin. The committee involved with the certification process included private nurseries, the Department, University, the Prairie Enthusiasts, and The Wisconsin Crop Improvement Association (WCIA). The WCIA is the state certifier of all seed.

The Department paid WCIA inspectors who traveled over 2,100 miles inspecting three private nurseries and numerous prairie remnants. The species lists that were prepared for 41 State Natural Areas were also provided to WCIA for use in certification of private nursery beds.

The WCIA certified 252 pounds of prairie grasses and forb seed that was collected by the Department on prairie remnants or harvested from Department nursery beds.

Establishment and Maintenance of Nursery

The Department planted 32.6 acres (9 acres of 3 species of grass and 23.6 acres of 26 species of forbs) of nursery beds at the Badger Ammunition Plant.

Forty acres of nursery beds were prescribed burned and maintained at Poynette and Sauk City.

Seed Harvest and Distributed

The Department provided 252 pounds of seed (233 pounds of five species of grass and 19 pounds of eight species of forbs) to private nurseries for establishment of certified nursery beds. The nurseries will return certified seed back to the Department at a three or five to one ratio.

The Department also harvested over 500 pounds of seed in 1996 for establishment of DNR and private sector nursery beds and for use in DOT and DNR restorations in 1997.

Department of Transportation (DOT) Roadside Project

The DNR prescribed burned four prairie restorations on a major state highway and also planted three species of forbs on seven acres at a DOT visitor center. The DNR also discussed planting demonstration plantings on the interstate involving private nurseries.

Acknowledgements:

The project was successful, due the work of state employees Scott Weber, Dave Meier, Jeff Gaska, Kristin Scheele and Mark Martin; Gene Amberson and staff at the Wisconsin Crop Improvement Association,

FIGURE 1

State of Wisconsin
Department of Natural Resources
Natural Areas Program, ER-4
Box 7921
Madison, Wisconsin 53707

APPLICATION AND PERMIT FOR COLLECTING SEED ON DEPARTMENT OF NATURAL RESOURCES LAND

Form 1700-39 8-95

Use of this form is required by the Department for any application filed pursuant to ss. 23.28 and 23.29, Wis. Stats., and NR 45.04(a) and NR 45.13(a), Wis. Adm. Code. The Department will not consider your request unless you complete and submit this application. Personally identifiable information provided on this form is not intended to be used for any other purpose.

Issuance of this permit does not exempt the applicant from complying with s. 29.415, Wis. Stats., prohibiting the taking of listed threatened and endangered species. A separate threatened and endangered species permit is required to collect those species.

Please read "Conditions on Which This Permit is Issued" before completing this application.

Applicant's Name	Name those who may be collecting under this permit
Street or Route	
City, State, Zip Code	
Telephone Numbers Home: ( ) Work:( )	

Name(s) of state land for collecting and specific locations(s).

Objectives

Collecting methods, including types of equipment or tools to be used, procedures, etc. BE SPECIFIC.

List species and amount of seed (lbs./oz.) to be collected from each area. Append list if necessary.

Disposition of seed (where seed is to be planted). BE SPECIFIC.

Beginning Date	Ending Date

I hereby certify that all the information is correct and true and I am aware of the guidelines governing seed collecting.

Applicant's Signature	Date Signed

LEAVE BLANK - DNR PERMIT APPROVAL PORTION

CONDITIONS ON WHICH THIS PERMIT IS ISSUED

1. All collections shall be used for establishing nursery beds or for restorations by government agencies or nonprofit organizations.

2. Collecting shall be conducted in a way that preserves the area's features. In order to avoid attracting attention, all collecting must be done away from roads and trails unless specified otherwise in the permit. It may be necessary to limit the amount and species collected.

3. The permit holder must notify the land manager(s) before beginning permitted activities.

4. This permit does not apply to plant species protected or regulated by state or federal law. To collect protected or regulated plants or animals, you must obtain the appropriate permits from the Department of Natural Resources and/or the U.S. Fish and Wildlife Service.

5. The permit holder shall provide the Department with amounts of clean seed collected by March 1. Address: Native Plant Seed Program Coordinator, Bureau of Endangered Resources, Department of Natural Resources, Box 7921, Madison, Wisconsin 53707.

6. The permit holder or others authorized by the permit must carry the approved permit while collecting seed.

7. The Department of Natural Resources is not responsible for the safety of personnel or their equipment while collecting seed.

8. The Administrator, Land Managing Agency, may terminate this permit upon the permit holder's breach of any or all the terms and conditions contained herein.

9. The permit holder must abide by the Guidelines for Collecting Seed on Department of Natural Resources Lands, attached.

Permission is granted for the applicant to collect seed on Department land according to the conditions specified on pages 1 and 2, and according to the following reservations: (include project duration)

APPROVED

Administrator, Land Managing Agency _____ Date _____

Guidelines for Seed Collecting
on Department of Natural Resources Land
Instructions for Collectors

The pressure to allow seed collecting from prairies and other communities stems from the lack of other remnant areas with local genotypes where seed can be collected. This shortage leads many agencies, private landowners, natural landscapers, and nursery operators to give up the idea of native plant establishment or to import easily available, less expensive, but genetically inappropriate seed. The long-term solution to this problem is to have enough acres of restored areas of local ecotypes to allow those who wish to acquire seed to do so.

Seed collecting influences a natural community by removal of seeds and chaff and by physical disturbance of the site. The seed crop is part of the community and participates in a variety of roles. The notion of seed going to waste is a misconception that follows from disregard for the roles of seed in food chains, soil nutrient dynamics, seed banks, and other ecological processes. The effects of repeated seed harvest on, for example, associated organisms, soil seed banks, and the ability of the community to heal after natural or cultural disturbance is largely unknown.

Concern about potential adverse effects and the need to protect natural areas for the prime purposes of safeguarding biodiversity and its dynamics and providing for research and teaching are reflected in the recommendations that follow. At the same time, the recommendations address the important role genetic pools in natural areas can play in increasing biodiversity in Wisconsin.

1. Permitting Recommendations

Present law (NR 45.04) and (NR 45.13) prohibits the collection of plants and plant parts, including seeds, from Department land and State Natural Areas without a permit. This document is established to govern the issuing of permits by the Bureau of Endangered Resources.

Endangered and threatened species are protected by an additional permitting process (Permit for Endangered and Threatened Species). In general, seed of such species can be collected only as part of a recovery effort.

a. Seed collecting will be by permit only.

b. Permits may be issued for restoration projects undertaken by a government agency or non-profit organization.

c. Commercial native plant nurseries and individuals may be permitted to harvest seeds for stock plants of known regional genetic source not otherwise available for seed and plant production purposes. These stock plants must be established in Wisconsin production beds and should be sold only for use within the plant's genotypic region.

d. Permits may be issued to collect rare species for seed bank storage or a specific recovery program.

2. Permit Criteria: Staff Considerations

   a. Collecting will be permitted only where target species are known to be abundant.

      NOTE: Consideration should be given to the relative abundance of a given species and will take into account the reproduction and average longevity of that species.

   b. Never harvest more than 10 to 25 percent of available seed. This will depend on the species, its relative abundance, and the amount of seed normally produced by that species.

      NOTE: Consideration should also be given to the relative importance of seeds to the reproduction and average longevity of a given species. Limits on short-lived, non-vegetative spreading species should be much more conservative than those on long-lived, rhizomatous species.

   c. Seeds from species on Wisconsin's Endangered and Threatened Species List cannot be collected without a Permit for Endangered and Threatened Species. Requests to harvest species of special concern will be treated on a case-by-case basis.

   d. After three to five (species dependent) years of collecting the same species, the permittee should collect from their restoration efforts and not from Department land.

3. Permit Criteria: Instructions to Harvesters

   a. In requesting a permit the applicant must identify the purpose of the project, list the species and desired quantity by site, cite acreage to be planted, name those who will do the actual collecting, and describe the collection methods to be used.

   b. Harvesters should collect from as many sites as possible within a given ecoregion to disperse the impact and get better genetic representation. An exception to this general guideline is the restoration of an area adjacent to an existing remnant. In this case all seed should be collected from the adjacent remnant.

   c. Harvesters must check to be certain the seed is mature and should not collect immature seed.

   d. Harvesters must disperse the collecting effort throughout the designated area.

   e. Hand harvesting and hand tools, e.g., shears and box combs, are acceptable harvest methods. Larger mechanical devices are prohibited. Other tools will be evaluated on a case-by-case basis.

   f. The permittee is required to submit a report detailing the amount of seed collected by species and a map showing where each species was collected within the area.

   g. The permittee, except for nurseries, should allow collecting by others on their restorations where possible.

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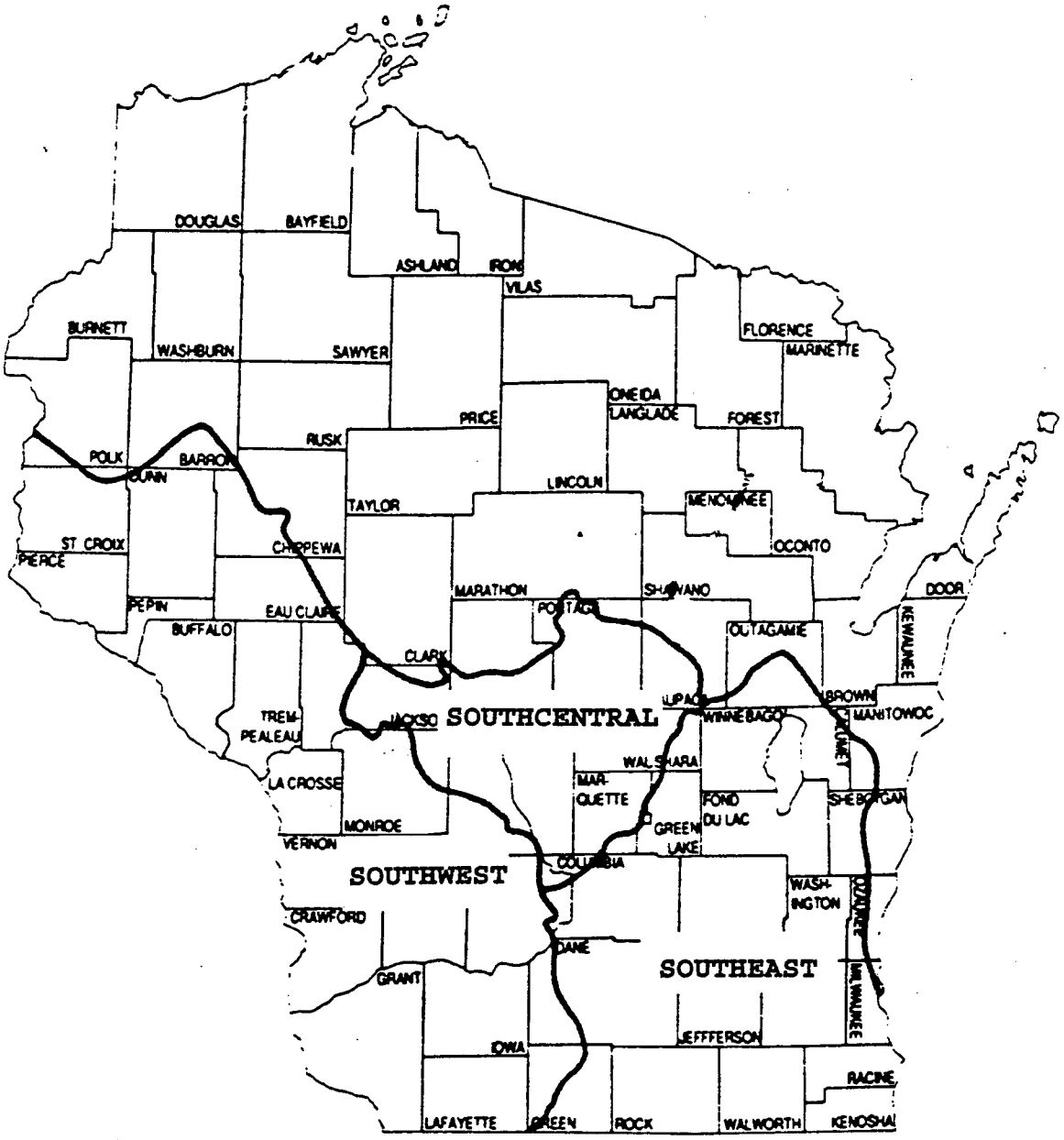


SEED COLLECTING REGIONS

FIGURE 2

Native Plant Seed Program

Seed Processing Instructions

by

Scott Weber
Native Plant Seed Coordinator
Wisconsin Bureau of Endangered Resources

March 16, 1995

Seed Cleaning Procedures for Prairie Grasses and Forbs

General:

Seed cleaning is an art. No machine can clean seed to perfection. The methods and specifications described here should produce acceptable results, but only practice, innovation, and foresight will assure a top quality product.

The method of harvest also makes a tremendous difference in which cleaning procedure you use. Different combines and different people all harvest seed with their own quirks and foibles. The starting product may be very clean or full of sticks and debris. The cleaner the seed is to begin with, the cleaner the seed will be at the finish, and a substantial amount of time can be saved. The costs of harvest versus seed cleaning will have to be weighed by each individual. What may be ideal for one project may be unnecessary for another. Not all plantings need completely dehulled legumes or debearded grasses, especially if hand-broadcast.

If, however, the seed will be used by a variety of users with widely variable planting equipment, the seed must be clean enough to flow easily without sticking and clogging drills and seeders. Most or all of the poor or undeveloped seed will need to be separated out, and any fluff, hulls, or dispersal apparatus should be removed if possible. Clean seed assures the buyer that they have not paid for fluff and makes it easier to plant the correct amount of seed per acre.

Seed processing involves three basic steps: 1) harvesting, 2) threshing, and 3) separating the seed from the chaff. Harvesting seed can be done by hand or by machine, depending upon the species and the situation. Many types of machines are available, from the large combines to hand-held seed strippers that work much like a lawn mower sweeping cuttings into a bag. Some seed strippers are just the right size for an ATV or small tractor and are ideal for harvesting on difficult terrain or along roadside right-of-ways, while others are made for larger tractors and acreage. Older "pull type" combines which run off the tractor PTO can perform very well for harvesting a wide variety of flower and grass species, if one can be found in good shape.

Hand harvesting is sometimes the only way to obtain foundation seed from local remnants, or for some species that will foul or clog machinery. Some species have seed too fine or too valuable to machine harvest. Because hand collection can be time consuming, it is important to judge the seed quality before you harvest. Seed quality can vary tremendously from one year to the next, depending on weather and other conditions. One year may be a banner year for a species, while the next year may be a bust.

For many grasses, it is difficult to tell by eye whether or not the seed is good because many "seeds" are just empty hulls with undeveloped embryos. Experienced collectors can tell by eye whether seed is good, but most of us check the seed by pinching it between fingernails. If good seed is present, the kernel will pop out of the hull. By sampling several seeds, a rough estimate of the percentage of good seed can be determined.

In some years, the amount of good seed is high, around 80%, while in other years it may be less than 10% or zero. Most species need ample rainfall and good pollination weather to set viable seed. A site that has been burned will produce much more seed than an unburned site. If you are going to haul yourself or your combine a long way, it pays to check the condition of the stand beforehand. In some cases, twenty bags of combined material can clean down to just one bag of clean seed.

Before harvesting, the seed must be dry. Morning dew must be allowed to evaporate. Many breakdowns are the result of harvesting wet seed, which clogs the various combine augers and sieves. Once, when combining Indian grass which was a little too wet, we took out all but the largest sieve, and shut off the grain elevator. Then we stopped often to scoop out the seed by hand. Later, after the material had dried for two weeks under cover, we re-threshed the seed with all sieves and a finishing screen. This worked very well, but should be saved for an emergency when the seed cannot wait to be harvested. Most native grasses have a short harvest period lasting only two weeks at best. This is where ingenuity can make the difference between getting the crop in and losing it.

After harvest, the seed will need to be dried out further. All combined or hand harvested seed should never be left in a bag in the sun immediately after harvest. The seed will begin to heat up quickly unless it is spread out to dry under cover with good air circulation. A good setup for drying can be seen at the Illinois State Nursery, where the grass seed is placed in bins which have fine mesh burlap on the bottom. Blowers underneath the bins force air up through the burlap to help dry the seed quickly. If you must spread the seed out in a barn, place the seed thinly on top of a plastic tarp and fork or rake the seed over once or twice daily. Some seed, such as lupine, may have to be placed in a box outside in full sun with a screen over the top to prevent the seed from escaping as it pops from the pods.

Never store seed in plastic bags unless you are certain that no further drying is possible. Smaller lots of grass or forb seed can be stored in paper grocery bags and hung by clothes pins from line strung between barn beams. Hanging the seed also keeps it away from rodents. Clean seed must be stored in a rodent-proof container or storage room. We have stored clean, dry seed in resealable plastic bags which are kept in steel drums with

tight fitting lids. 55 gallon drums that held fruit juice concentrate can be picked up at processing plants. These are much nicer to use than those which contained petroleum products, although you will probably have to pay a fee for them.

However harvested, the seed must cleaned afterwards to some degree if a quality product is desired. Most seed from the combine will not have to be re-threshed, but if debearded seed is required, an additional milling is necessary. For debearding grasses or dehulling legumes, a debearding machine or hammer mill is used. Debearding machines consist of a cylinder of stiff bristles that rub the seed against a screen. A hammer mill chops the seed with steel hammers and the clean seed drops through a screen underneath. By using slow speeds and proper screen sizes, the hammer mill will also debeard grasses without destroying kernels, but care must be used. The advantage with a hammer mill is that it is cheaper than the debearding machine and is more versatile. The hammer mill will de-awn Canada wild rye, a species known for causing problems with debearding machines.

Once the seed is threshed or dehulled, the final step is the fanning mill. The fanning mill separates the seed from the chaff by size and density. The top screens separate out the large bits of straw and chaff, while the bottom screens filter out the tiny dust and chaff. Some species cannot be used with a bottom screen because either they are very small or they get hung up on the fine screens and clog the machine. Fan speed can be adjusted, depending on the crop. On heavy seeded crops, the fan can be set on high speed, whereas finer seeds need a slow fan speed, unless it is easier to blow off the seed and allow the heavier chaff to fall into the grain box beneath the mill.

With a wide variety of crops, it is necessary to collect each fraction from the mill and find where the good seed is falling. In many cases, each fraction must be reprocessed, sometimes with different screens and fan speeds. Again, this is an art more than a science, and an experienced seed cleaner is a valuable person. It is impossible to train someone completely, though a new person will also think of new solutions to old problems and get some seed one measure cleaner than before.

After fanning, a final hand screening may be necessary for separating out the last bit of chaff, weed seed, or dehulled grass kernels.

For some species, the methods described above will not work well. Butterfly weed and other milkweeds, for example, create a lot of dust and are difficult to fan. The method I have used over the years is to remove the seed from the pod by hand and fluff out the seed over a screen set at an angle. I then light the milkweed silk with a match. If done properly, the silk burns off rapidly, leaving behind clean seed. Obviously, this must be

done in a well ventilated, fireproof area, without drafts that may blow the seed away before lit. But it works! The seed is not harmed at all as long as it is spread out with plenty of air. Others have used the vacuum cleaner method, where the seed is sucked into the vacuum. The chaff clings to the filter, while the good seed falls into the canister. This method works only with the canister type wet or dry shop vacuums.

For small lots of puccoon seed, I have separated the good seed from the bad by floating them in a pan of water. All the good seed sinks, and the "duds" float to the surface. The bad seed is hollow, but it looks normal, except for a tiny hole where some insect has burrowed into the seed.

The cleaning process, in addition to allowing the seed to flow smoothly through planting machinery, will improve the germination percentage by fanning out all the bad seed. This is critical to producing a quality product. The buyer of unclean seed has no idea what percentage of good seed is present just by looking at it, unless they are pure grass kernels. The bags must either be labelled as to quality or include a seed per gram or ounce estimate.

The Combine

A combine is designed to do all three steps: harvesting, threshing, and separating, and hence the name "combine". A grain combine cuts the seed heads with a sickle bar cutter, and an auger (a belt of canvas was used in old models) carries the cut grain with the stalks into the thresher. The thresher consists of a cylinder which beats the grain against steel ribs covered with hard rubber to prevent damage to the seed. The cylinder speed and the distance between the cylinder and the ribs, or "concaves" can be adjusted for different crops. The threshed seed is carried to the separator, which cleans the seed from the straw. The straw gets tossed out onto the field, while the grain passes though a pair of sieves. As the grain falls thorough the sieves, a fan blows out the finer bits of chaff, and any smaller bits of straw are shaken out. The clean seed drops to the bottom where it is augured into the elevator, which carries the seed up to the top of the grain bin.

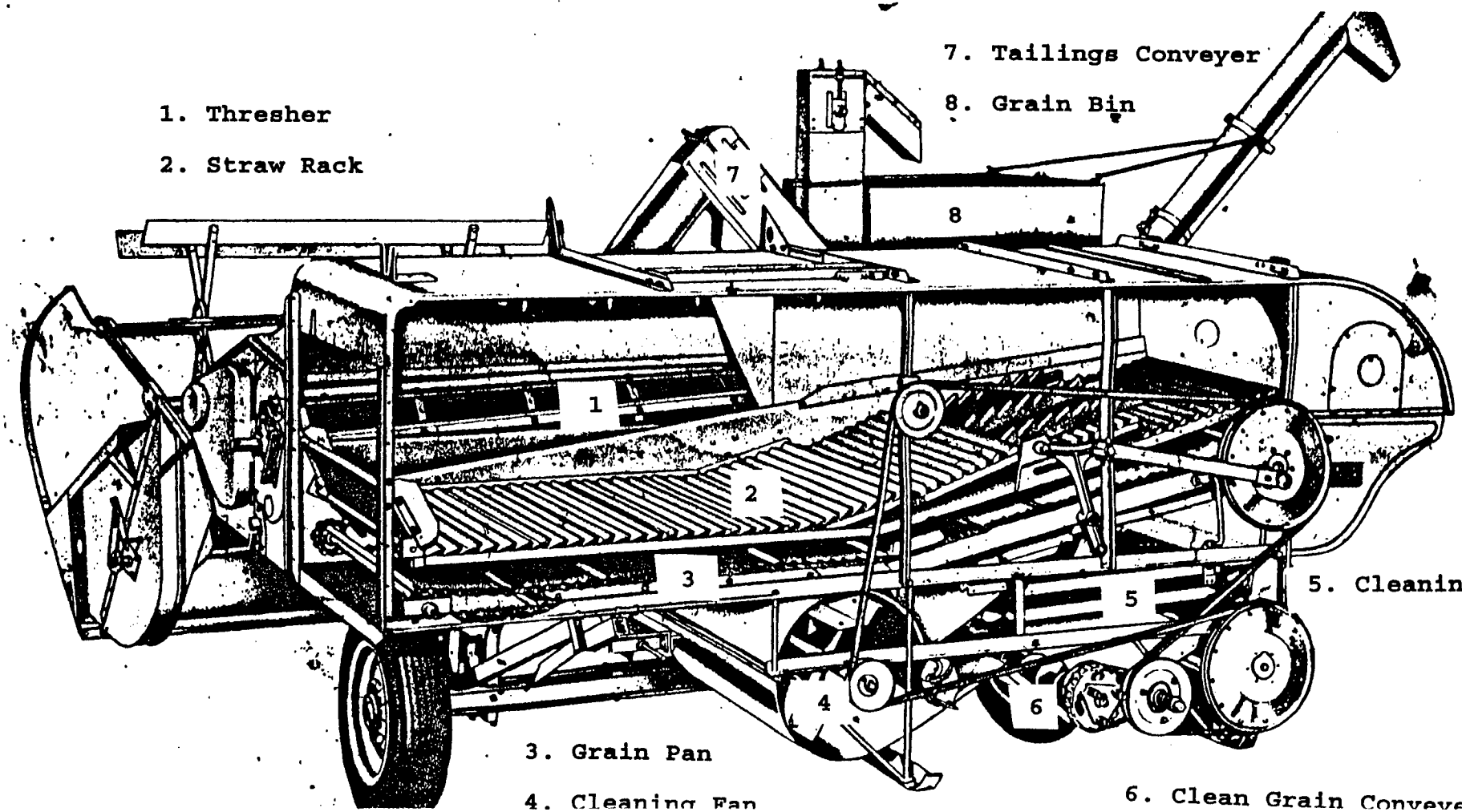
Older combines also had a scour clean, which cleans out additional weed seed before the grain is dropped into the bin. This final cleaning is especially important for harvesting small seeded crops, like black-eyed susan. Some combines had a bag attachment to catch the weed seed so that it would not go back onto the field. In the case of black-eyed susans, the good seed is cleaned from the larger bits of chaff and is "rejected" as weed seed, while the rest goes into the grain bin. With the bag attached, the black-eyed susan seed gets neatly bagged up.

THE THRESHING STORY

The seed being threshed should be ripe and dry before attempting to start threshing. The header cuts and conveys the crop to the cylinder where it is threshed. The cylinder threshes the seed from the straw and moves both seed and straw onto the straw rack. The movement of the straw rack shakes the seed and straw, letting the seed and chaff fall through the rack onto the grain pan where it is conveyed to and falls onto the cleaning shoe. As it falls onto the cleaning shoe it is falling through a stream of air which starts the separating action.

The movement of the cleaning shoe combined with the blast of air from the cleaning fan, blows the chaff out of the machine and lets the clean seed fall through the sieve and into the clean grain conveyor. The unthreshed heads or partially threshed heads fall into the tailings conveyor and are returned to the cylinder to be threshed again. Meanwhile the straw is being moved over straw rack and falls out of machine onto ground.

The threshing story mentioned above is general to all combines. For proper operation and adjustments of your Model "72" ALL-CROP Harvester refer to the Operators Manual.



Ideally the combine will do all three steps flawlessly and little if any additional cleaning will need to be done. Fairy tales also come true. Those of you familiar only with bags of clean grain and shiny, new combines gobbling acres of corn with apparent ease are not aware of the amount of cursing, swearing, knuckle crunching, pondering, and praying that most seed harvesters have experienced at one time or another. No piece of farm machinery is capable of surviving the abuse of earth, rock, seed, and horsepower without breaking down at some point.

To make matters worse, the newer combines are less likely to handle the wide variety of seeds we are interested in harvesting. They have been carefully selected for corn and beans, and occasionally wheat and oats. Such heavy seeds are easy to clean, because most of the chaff can be blown off easily with high fan or wind speeds. Without shutting the wind off entirely, the prairie grasses and other light seeds will be blown right out with the straw. The sieves and finishing screens are also not set up for those seeds.

For clean harvesting of prairie seed, the best results have come from the Allis Chalmers All Crop. No longer in production, the All Crop was designed to handle a wide variety of crops from wheat to flower seed. The wind is fully adjustable, with leaf valves that can shut off the wind completely. There are two adjustable sieves, as well as an assortment of finishing screens. Most models also came equipped with a scour clean. By adjusting the sieves, adding or removing the finishing screen, changing the scour clean screen size, or even removing a sieve entirely, a high degree of cleanliness can be achieved for many crops.

Older models had a canvas belt which carried the seed from the cutter bar to the thresher. On the model 72, the canvas was replaced by an auger and raddle feed. While the canvas may be ideal for tiny seeded crops, the auger feed is an improvement and can handle a wider variety of material under more conditions than the canvas. The auger feed keeps the seed from bouncing out if the terrain is uneven.

The Allis, however, has some serious drawbacks. Firstly, it is not made anymore, and parts are impossible to get, unless you have more than one. Secondly, they are always breaking down because none will be in mint condition. The most common problem is the breakage of roller links. This is not too bad, since they are replaceable. But they can mean a sudden delay in harvest. There are also so many grease fittings that it is impossible to remember them all. Manuals are worth their weight in gold if they can be found.

Another big drawback is they cut a swath of only 7 feet. For larger acreage this becomes impractical, especially with thick stands of big bluestem, which will clog the thresher if cut

too quickly. Since the All Crop cleans better than larger, modern combines, and alternative would be to harvest the grass with a newer, larger combine, and then use the All Crop as a stationary unit. The All Crop makes a great stationary thresher and can take the place of large fanning mills or threshers to clean the seed before finishing on a smaller mill. The All Crop, however, was built before OSHA standards, and care must be taken to stay away from moving parts.

The All Crop does an excellent job with the short grasses and forbs. In this capacity, it pays for itself over and over again in a single harvest. Its versatility makes it ideal for a wide variety of crops and seed sizes.

The Hammer Mill

The hammer mill we use is made by the C.S. Bell Co., Tiffen, Ohio. It has a two horse, variable speed motor, and comes with an assortment of screen sizes. For convenience, we assigned each screen size a number as follows:

Screen size:	Number:
3/4"	0
3/8"	1
1/4"	2
3/16"	3
1/8"	4
1/16"	5

Each screen is clearly marked with the number, and it makes finding a screen easier than reading fractions.

The hammer mill must be used with caution, both for the operator and the seed. All belt guards should be in place, and the motor control must be completely off before opening the mill.

A dust collection system is very important. At the very least, workers must wear good dust masks with replaceable cartridges. The dust can aggravate asthma sufferers or other allergies. Some seed, especially the mints, have strong odors which some people find uncomfortable. Some seed cleaning operations I have visited are terribly uncomfortable, with low ceilings and poor ventilation. This is a health and fire hazard.

I recommend a dust collection system which can carry the dust out of the building. Some day we may all be suffering from "prairie seed lung" without proper precautions. The technology is available to prevent problems; it should be well worth the investment. Good workers deserve a good work environment.

Also necessary are safety glasses and hearing protection. The fanning mills are fairly quiet, but some seeds in the hammer mill can be very noisy. Most emphasis is on wearing safety glasses, because eye injuries can be quite serious and immediate, whereas hearing goes gradually from continual exposure and usually does not amount to a medical emergency. However, who wants to lose either their eyesight or hearing? The protection is available, and being made more comfortable to wear all the time. If you want to ruin your lungs, sight, or hearing, save it for your night life.

Care also must be used so that seed is not damaged. The mill can, at high speeds or with the wrong screen size, destroy good seed. Also, if too much chaff is chopped up with the seed into fine pieces, it may be difficult to separate the good seed from the chaff.

To do a good job, it helps tremendously if most of the stems and larger bits of chaff can be removed first. The purpose of hammering the seed is to dehull seed, not chop up chaff. If the larger bits of stems and chaff can be removed by rubbing the seed first over a screen ("pre-screening") or through the harvesting process, a much cleaner product can be had after the milling and fanning. Thus, with the grass seed, it helps to run the seed through the fanning mill first to remove most of the sticks. Then the fanned seed can be put in the hammer mill for debearding or dehulling. Usually more than one fanning or milling is necessary to achieve a good product. Only with heavy, round seeds, such as lupine, switch grass, or prairie dropseed, can one get away with only one hammering or fanning.

It is very important not to hammer the seed more than necessary, because seed can be damaged. Even seed of the same species, but different ecotype or quality, can have different requirements. Grass seed from one region may be harder than that from another and be better able to stand up to the debearding process. The solution is to first select a screen size which allows the material to pass quickly through the mill at low hammer speeds (on our control, 15-25 is considered slow). Try a few handfuls at first and check the results. Look for chipped or damaged kernels. At the right speeds, only bad or poor quality seed will be damaged.

Once the seed has been hammered successfully once, it can be fanned to remove more chaff, or it can be hammered again with a finer screen size to dehull more seed. Each species will require

a different combination of hammering and fanning sequences. This may sound complicated, but once a method that works has been found, it is easy to process large amounts of seed fairly quickly, with only slight adjustments necessary for future seed lots.

We have found that the best product is achieved by hammering seed through fine screens at low speeds. The screen size should be larger than the longest dimension of the seed you wish to clean. This should prevent seed damage.

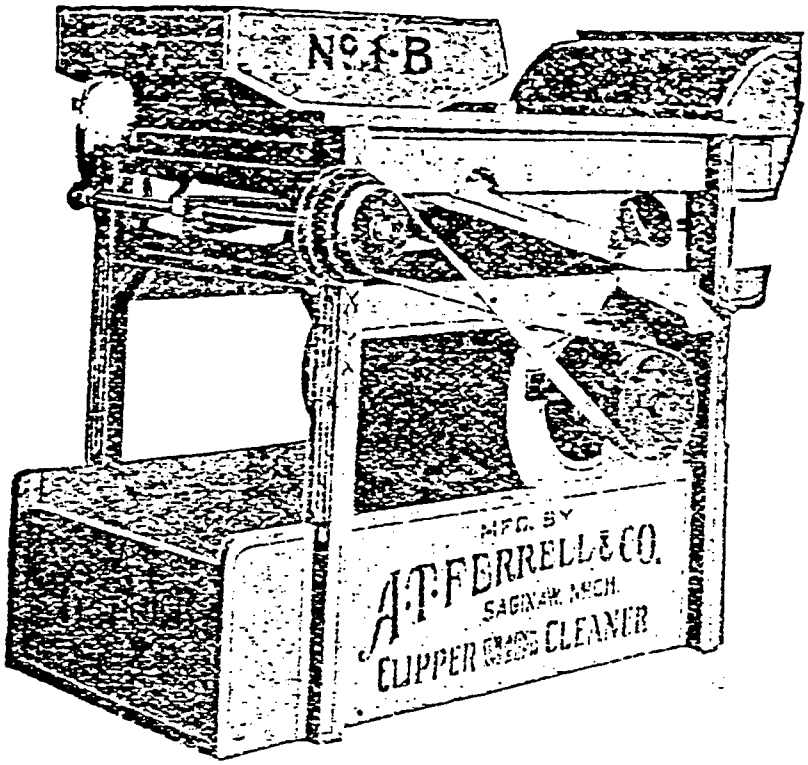
We fitted the base of the mill with a box to catch the seed and keep it from bouncing away. The box is slotted at the ends for removable gates for shoveling out the seed. It is easiest to remove the seed if a bucket or bin in placed in the box to catch the seed as it falls out the bottom of the mill. Compressed air or a good vacuum is required to clean the mill between species or varieties.

The Fanning Mill

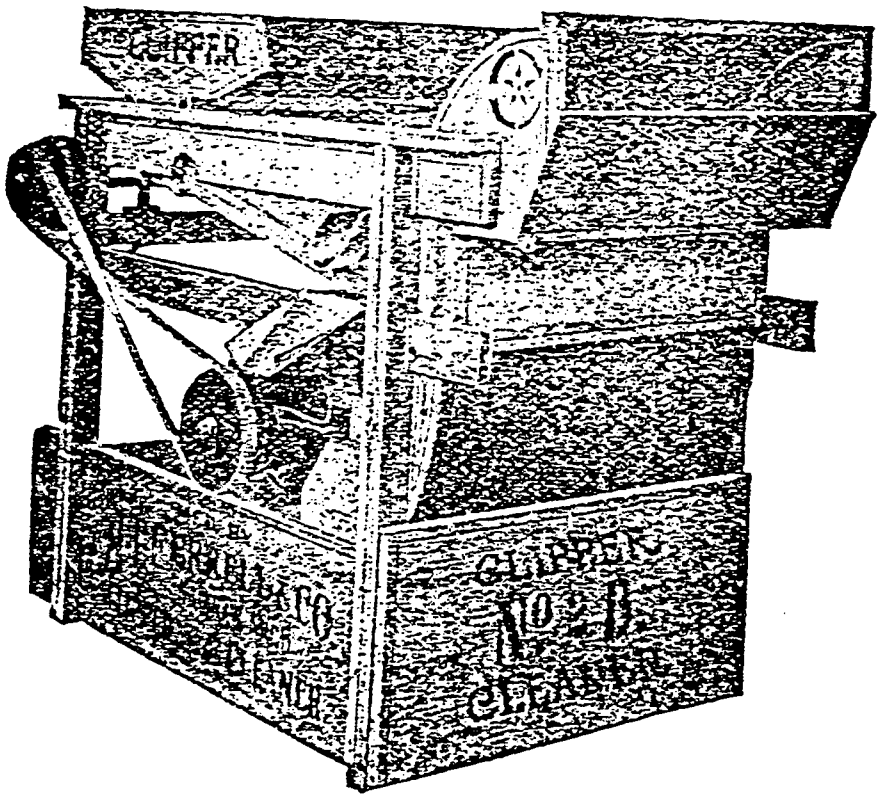
The fanning mill we have used is the Clipper 2B, which was manufactured by the A.T. Ferrel Co, Saginaw, Michigan, before plywood was invented, or at least available cheaply, judging by the construction. Screens are still available framed to fit the Clipper, but the mill can be bought at an auction or from a person specializing in reconditioning the mills. New mills are available, but there are many for sale at farm auctions. Fanning mills of this size sell at auction from $80 to $400, depending on the condition or antique value. Keep in mind that new screens are expensive and cost from $40 to $80, depending on the size. Fine wire screens are the most expensive. Some mills may be worth buying for their screens alone, if they are the correct size or if they can be remounted.

All older mills will need to be reconditioned. The fan shrouds were built from solid wood, and most have cracked where there is short grain. All of the curved pieces can be replaced with a good grade of plywood. If you can afford it, 3/4" hardwood plywood can be used to replace many of the large pieces, such as the bottom box, as well as the curved pieces. The plywood will give much needed stability. Most of the old Clippers were simply nailed together. The nails can be replaced by screws. In some cases, additional bracing may be needed to prevent the mill from rocking back and forth.

For one mill, I had to discard most of the bottom boards, fan shrouds, sheet metal, etc.. The old pieces can be used as templates for cutting new ones. This is a lot of work and requires some intermediate woodworking skills, but the end result is a machine much more stable and better built than the original



No. 1-B CLIPPER
Grain, Seed and Bean Cleaner



No. 2-B CLIPPER
Grain, Seed and Bean Cleaner

for much less than a new mill, if you don't charge too much for your labor.

In addition to old, punky wood (old barns are not good places to store machinery for long periods of time), the metal hardware must be cleaned. The fan and shaker rods spun in ungreased brackets. These brackets must be retrofitted with grease fittings or replaced by bracket and ball bearing assemblies available at most farm supply stores. Some rod diameters must be turned down to the next common size, as many machines have worn bearing surfaces. Alternatively, the rods can be shimmed and fitted into a sealed bearing unit, thereby ending any further wear to the rod.

The amount of wind from the fan is controlled in either one of two ways: 1) by a damper which controls the amount of air flowing into or out of the fan, and 2) by step pulleys or a variable speed motor. The Clipper comes with step pulleys which give three fan speeds: low, medium and high. The speed is adjusted easily by sliding the pulley belt from one step to the next. The step pulleys are made of wood and may need to be replaced or refinished. Some machines also have sliding dampers on the side of the fan housing to restrict incoming air.

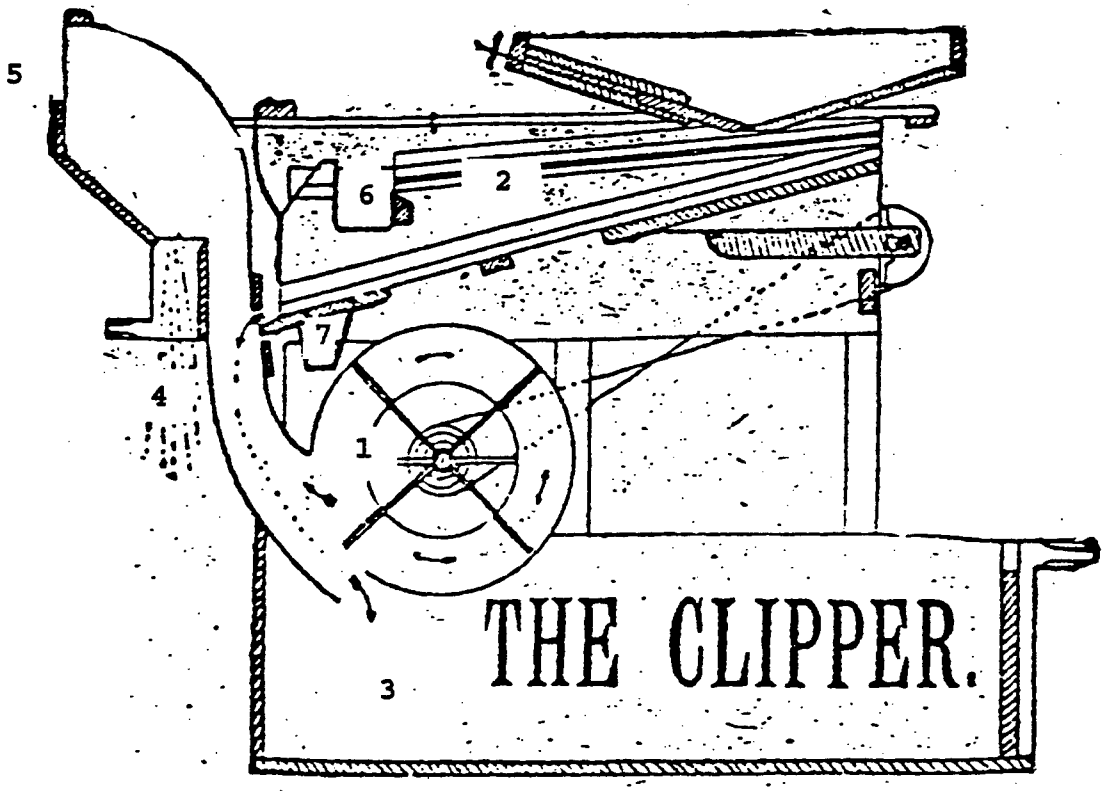
For the best results, I favor a variable speed motor to adjust fan speed. The step pulleys will work for most seeds, but eventually you will want greater adjustability. It is also helpful to control the speed of the shaker as well as the fan. On the Clipper 2B, only the fan speed is adjustable.

All fanning mills work essentially the same way: there is a "shaker" which holds the screens and separates the seed and chaff by size, and a fan, which separates the seed by density. The shaker unit is angled slightly and moves back and forth, usually with a rod and cam assembly, so that seed falls through the top screen. The larger chaff slides over the top of the screen and is dropped off into a trough which directs it into a bucket on the floor. The seed drops through to another screen, which allows the fine chaff to fall through, but is too small to let the seed through. The seed is shaken across the bottom screen until it falls down to a seed box. As it falls, the air from the fan blows off the light bits of chaff still present with the seed. Depending on the species, good seed may be found in more than one fraction.

On the Clipper, the seed and chaff are separated into five groups:

1. the bottom box (BB)
2. dense blown (DB)
3. light blown (LB)
4. right side (RS)

Clipper Fanning Mill



1. Fan
2. Shaker
3. Bottom Box (heaviest fraction)
4. Dense Blown (medium weight fraction)
5. Light Blown (lightest fraction)
6. Right Side (discharge shoot for large chaff)
7. Left Side (discharge shoot for fine chaff)

5. left side (LS)

Bottom box: This is the heaviest fraction. This is where, ideally, all the good seed will fall if the wind speed is adjusted properly. The heavy seed will fall directly from the shaker into the bottom box. On the Clipper, it is under the fan housing.

Dense blown: This is the fraction that is too light to fall into the bottom box, but too heavy to blow out the upper-most exit from the mill. The dense blown fraction usually has some good seed in it, or it may contain most of the good seed for the lighter-seeded species.

Light blown: This is the lightest fraction. A table should be set up to catch all the light blown material. Generally speaking, it is mostly trash, but some good seeds from lightweight species may be found here. Some of the seed will appear good, but on closer inspection are just empty hulls or seed without embryos. In the seed cleaning data, the light blown fraction is described in terms of the distance from the fanning mill the material has been blown, so, for example, 12" refers to the first foot of material from the mill. Anything beyond one foot could be considered trash, but seed within the first foot may still be good.

Right side: On the Clipper, the heavy chaff off the top screen winds up in a bucket at the right side of the machine (viewed as you stand behind it). Some good seed may be here if it was too big to fall through the screen or if some still clings to hulls, seed pods, or sticks.

Left side: On the Clipper, this is where the fine material that fell through the fine, bottom screen is discharged. Some good seed may fall here if the bottom screen was too big.

All fanning mills should have fractions of seed or chaff similar to those found on the Clipper; only the location where these are found will vary. Also keep in mind that fine seed will find its way through cracks, etc.. Check the mill to make sure seed is not winding up in some "mystery compartment". The mill should be cleaned thoroughly after each species or between varieties to prevent mixing.

There are three basic types of screens, 1) round hole, 2) slotted, and 3) wire. The most frequently used are the round hole screens. They come in 64th inch fractions. We have in inventory 1,4,5,6,7,8,9,11,14,16,20, and 32 64th inch round screens.

The slotted screens come in 1/2 inch and 3/4 inch slot sizes, with varying widths. These also come in 64th inch

fractions. We have 10/64 and 14/64 inch by 3/4 inch slotted screens, and a 1/13 x 1/2 inch slotted screen.

Also useful for fine seed crops are the wire screens. The wire screens we have in inventory are 6 x 26, 6 x 19, 6 x 28, and 6 x 30.

Additional Screens:

In addition to the fanning mill screens, other screens are necessary for hand screening bulk seed to get rid of extra stems and debris, or screening the end product from the fanning mill to remove weed seeds or separate pure kernels from seed with hulls.

For screening of bulk seed, large, 3'x 3' frames are used with screen stretched over one end. Another box to fit the screened frame can be built to catch the fine screenings. A few good sizes to have are as follows:

1/8" hardware cloth

1/4" hardware cloth

1/2" hardware cloth

16 x 16 window screen

28 x 28 fine screen

Brass sieves commonly used to separate soil sample particles are also good. The sizes we have are as follows:

Sieve number	Opening (metric)	Opening (inches)
18	1 ml.	.0934 in.
35	500 micrometers	.097
40	425	.0165
45	355	.0139
50	300	.0117
60	250	.0098

Additional Notes:

Most of the cleaning data presented here is for hand-picked seed. Seed from the combine may not need a hammering to break apart seed pods or seed heads. If the material has been combined, the best strategy is to fan the seed first to remove sticks and chaff, and then decide whether a hammering is necessary. Here is where fine-tuning the combine can save a lot of time with additional seed processing. The fanning mill screen sizes should apply to both hand picked and combined material if there are not too many weed seeds present.

For species requiring a "super-low" fanning mill speed, use either a slow motor, or fully close the side dampers on the Clipper to restrict air flow. We used two machines, one with a slightly slower motor, which appears to be due to differences in age or manufacturer, not labelling specifications, since both are rated equally in horsepower, rpm, etc.. To avoid confusion, no distinction is made with respect to the motor used, except for those species requiring the slowest speed setting. Remember always to check all fractions for good seed and chaff, and adjust the fan speed as necessary to fine tune the process.

Seed Processing Data Sheet

Species: Andropogon gerardi (Big bluestem)

Combined? Yes. No weed seeds.

Pre-screening: No

Hammermill:	**Step 1**	**Step 2**	**Step 3**	**Step 4**
Motor speed		30		
Screen size		4		

Comments:

Fanning Mill:	**Step 1**	**Step 2**	**Step 3**	**Step 4**
Fan speed	low	low	medium	
Top screen	11/64	6/64	6/64	
Bottom screen	9/64	blank	blank	
Bottom box	good	good	kernels	
Dense blown	good	trashy	good	
Light blown	12"	trash	good	
Other				

Comments: 1) Hammer bottom box, dense blown, and good seed from light blown, in step 2. 2) Refan bottom box from step 2 in step 3.

Screening and sifting:

Final Comments: 1) Dense blown and light blown from step 3 was combined as one fraction of final product. Pure seed from bottom box in step 3 was kept separate as final product.

SHEETS FOR ADDITIONAL SPECIES CAN BE OBTAINED FROM MARK MARTIN 608-266-8916

FIGURE 5

PLANTING RATE RECOMMENDATIONS FOR WILDLIFE PLANTINGS:

Grasses:

Suggested seeding rates for prairie grasses have ranged from 5 to 25 pounds per acre! Higher rates are based on bulk pounds, not pure live seed (PLS), but are still quoted often for PLS. A total of five pounds per acre for a combination of the major prairie grasses will sow about 15 seeds per square foot. PLS should have a germination rate of at least 50 percent. Given that a three year old big bluestem plant can cover nearly one square foot, this planting rate is more than adequate.

Five pounds per acre is the average planting rate for the Native Plant Seed Program production fields for establishing single stands of big bluestem, Indian grass, and little bluestem, and has proved very satisfactory. Switch grass has twice the number of seeds per pound as big bluestem and can be planted at two and a half pounds/acre. Solid stands of Canada wild rye can be achieved with four pounds per acre. One to two pounds per acre of Canada wild rye is adequate for use as a quick cover crop when planted with other grasses. The Canada wild rye matures quickly and will be present for about three years while the other grasses increase. Too heavy a seeding of Canada wild rye, however, will delay maturity of other grasses. It can be left out of the mix entirely on non-erodible sites.

For mixed grass plantings, five pounds of PLS is all that is needed to establish a solid stand of grasses. You may want to plant more Indian grass, especially when planting forbs, than big bluestem since Indian grass is not as aggressive and stands up better for winter cover than big bluestem. High planting rates, particularly of big bluestem and switch grass, will make long term forb establishment difficult, since those species will dominate the entire planting within a few years. For short grass plantings, or those where a diversity of forbs is desired, big bluestem and switchgrass should be planted at less than one pound per acre or left out entirely.

Rates for mesic soil:

		Indian Grass Preference
Big bluestem	2 lbs.	1 lb.
Indian grass	2 lbs.	3 lbs.
Switch grass	1 lb.	1 lb.
Canada Wild Rye (cover crop)	1 lb.	1.lb.

Rates for dry-mesic soil:

Big bluestem	1 lb.
Indian grass	1 lb.
Little blue	2 lbs
Side oats grama	1 lb.

or

Indian grass	1 lb.
Little bluestem	3 lbs.
Side oats grama	1 lb.

Forb recommendations on other side.

Forbs:

Forb seed can generally be planted at whatever rate is affordable, up to five pounds per acre. Fine seeded, pioneer species, however, can be planted at rates of 2 oz/acre or less. These include species such as black-eyed Susan, bergamot, and yellow coneflower.

Forb seeding rates, upper limits:

Lead plant (Amorpha canescens)	4 oz	(mesic, dry)	
Sky blue aster (Aster azureus)	2 oz	(mesic, dry)	
New England aster (Aster novae angliae)	2 oz	(wet, mesic)	
White false indigo (Baptisia leucantha)	2 oz	(wet, mesic)	
Showy tick-trefoil (Desmodium canadense)	2 oz	(mesic)	*
Ox-eye daisy (Heliopsis helianthoides)	2 oz	(mesic)	*
Round-headed bush clover (Lespedeza capitata)	2 oz	(mesic, dry)	*
Rough blazingstar (Liatris aspera)	4 oz	(dry)	
Prairie blazingstar (Liatris pycnostachya)	4 oz	(wet, mesic)	
Bergamot (Monarda fistulosa)	1 oz	(wet, mesic, dry)	*
Yellow coneflower (Ratibida pinnata)	2 oz	(wet, mesic)	*
Black-eyed Susan (Rudbeckia hirta)	2 oz	(wet, mesic, dry)	*
Purple prairie clover (Petalostemum purpureum)	4 oz	(mesic, dry)	*
Cup plant (Silphium perfoliatum)	3 oz	(wet)	
Prairie dock (Silphium terebinthenaceum)	4 oz	(mesic)	
Compass plant (Silphium laciniatum)	4 oz	(mesic, dry)	
Stiff goldenrod (Solidago rigida)	2 oz	(mesic, dry)	*

* = Species that are usually more affordable and easy to establish.

Developed by Scott Weber and Mark Martin, Natural Areas Section, Bureau of Endangered Resources, Department of Natural Resources

November 1996

CERTIFICATION STANDARDS FOR NATIVE SPECIES PRODUCED IN WISCONSIN

INTRODUCTION

Seed certification of native species will be done by the Wisconsin Crop Improvement Association (WCIA). Wisconsin Native Species seed certification standards are reviewed by the WCIA Certification Committee which makes recommendations for any changes to the WCIA Board of Directors for their approval. The committee will include at least five persons knowledgeable about native seeds appointed by the President of the WCIA Board of Directors. The five persons will include three producers, one Department of Natural Resources representative and one member of a conservation organization.

PURPOSE

The purpose of this seed certification program is to maintain and make available to the public, quality seed of source-identified species of native plants so produced, handled and distributed as to insure proper labeling and identity.

GENERAL STANDARDS

CLASSES OF SOURCE-IDENTIFIED SEED

A. Four classes of seed shall be recognized in the certification of source-identified seed.

1. Source-identified Generation zero (G_0)
   Seed collected from native stands.

2. Source-identified Generation one (G_1)
   Seed harvested from a G_0 planting or nursery.

3. Source-identified Generation two (G_2)
   Seed harvested from a G_1 planting or nursery.

4. Source-identified Generation three (G_3)
   Seed harvested from a G_2 planting or nursery.

5. Generations beyond G_3 for specific species are recognized for certification if recommended by the Certification Committee and approved by the WCIA Board of Directors.

SOURCE IDENTIFICATION

A. The geographic location of all classes of source-identified seed shall be described as one of the following:

1. One or more of the Natural Divisions of Wisconsin (from *Natural Divisions of Wisconsin* map, Hole, F.D. et al., WI-DNR publication, 1994. Scale 1:1,000,000.) Maps can be obtained from the Department of Natural Resources–Bureau of Endangered Resources

2. One or more counties

3. Wisconsin

SOURCE CERTIFICATION

A. When requesting certification, a "Source-identified Harvested Seed Report and Label Request" form and an official seed sample are required for: each native species harvested from each collection site or production field.

B. Production on producer established fields may continue indefinitely or until problems occur which prevent certification. The certification agency reserves the right to limit or revoke the production rights on all fields.

C. Transferring unconditioned seed

1. Producers may sell and transfer unconditioned seed to a buyer who agrees to complete certification of such seed.

2. The producer is responsible for insuring that a copy of the "Transfer of Seed Pending Certification" certificate is filed with the certifying agency. This copy must be on file before seed samples from transferred seed will be processed in the laboratory.

ELIGIBILITY

A. The eligibility criteria for source-identified certification are as follows:

1. The species being considered for certification must be native to Wisconsin and shall not be a noxious weed under Wisconsin or federal law or regulation.

2. The producer must properly submit an application for source-identified certification.

3. Seed must be harvested from:

   a. a native stand

   b. a production field planted with certified Source-identified seed.

4. Seed must be harvested only from native sites or production fields which have been inspected and have received an approved current harvest-year Site Inspection Report.

APPLICATION

A. Application forms will be supplied by the certification agency. Completed applications for certification shall be submitted to the certification agency by June 7 of each year.

B. Maps shall be provided to the certification agency showing the location of natural collection sites or established production fields.

C. One Source-identified certification tag, for each seed stock lot planted, must be submitted with the application for field inspection of producer established fields.

FIELD INSPECTION PROCEDURES

A. Field inspection of the source-identified seed shall be performed by certification agency inspectors. Inspections will occur after heading but before harvest and will include verification of location, elevation (if applicable) and field size. Roguing of objectionable plants is required prior to field inspection and is the responsibility of the grower.

B. Specific collection site information is confidential between the grower and WCIA except through court order or during a Department of Agriculture, Trade and Consumer Protection (DATCP) inspection.

ISOLATION DISTANCES

A. Existing native stands must be isolated from planted stands of the same species by:

- 880 yards (0.5 miles) for grasses and sedges
- 440 yards (0.25 miles) for forbs.

B. For field or nursery grown material, beds must be isolated from stands of the same species of different or unknown genotypes and for which higher generation planting stocks were used to maintain source purity by:

- 880 yards (0.5 miles) for grasses and sedges
- 440 yards (0.25 miles) for forbs.

SEED INSPECTION PROCEDURES

See *General Seed Certification Standards* page 5.

SAMPLING SEED LOTS

A. Sampling procedures and testing methods recognized by the Association of Official Seed Analysts (AOSA) shall be used where applicable.

TESTING SEED LOTS

A. Seed analysis tests for labeling must be performed by the WCIA Seed Testing Lab, which will retain all seed samples. AOSA methods will be used where applicable.

B. All forb seed shall be free of dispersal apparatus not required for germination.

C. Purity

1. Wisconsin Certification Standards must meet or exceed minimum Association of Official Seed Certifying Agencies (AOSCA).

2. All seed must be certified for source-identity, species purity and mechanical quality.

3. Seed will be tested for presence of: inert matter, weed seed and other species, and for germination.

4. The seed shall contain no prohibited or restricted noxious weeds as identified in the State Seed Laws of Wisconsin.

D. Seed Quality Standards

See Table 1.

TABLE 1

SEED QUALITY STANDARDS

SPECIES	% INERT MATTER	% WEED SEED	% OTHER SPECIES	% PURITY	% GERM	SAMPLE SIZE/GMS.
GRASSES						
Andropogon gerardi (Big bluestem)	15	1	.25	85	60	100
Andropogon scoparius (Little bluestem)	25	2	.25	75	60	100
Bouteloua curtipendula (Side-oats grama)	10	1	.25	90	60	20
						*60
Elymus canadensis (Canada wild rye)	10	.5	.25	90	70	110
Panicum virgatum (Switch grass)	5	1	.25	95	60	40
Sorghastrum nutans (Indian grass)	10	1	.25	90	60	70
Sporobolus heterolepis (Prairie dropseed)	2	1	.25	97	50	10
FORBS						
Amorpha canescens (Leadplant)	2	1	.25	97	60	10
Asclepias tuberosa (Butterfly milkweed)	2	1	.25	97	60	20
Aster azureus (Sky-blue aster)	2	1	.25	97	60	10
Aster laevis (Smooth aster)	2	1	.25	97	60	10
Aster novae-angliae (New England aster)	10	1	.25	90	60	10
Baptisia leucantha (White false indigo)	2	1	.25	97	60	40
Desmodium canadense (Showy tick-trefoil)	2	1	.25	97	60	20
Desmodium illinoense (IL tick-trefoil)	2	1	.25	97	60	30
Echinacea pallida (Pale purple coneflower)	5	1	.25	95	60	20
Eryngium yuccifolium (Rattlesnake master)	5	1	.25	95	60	10
Euphorbia corollata (Flowering spurge)	2	1	.25	97	60	10
Helianthus laetiflorus (Showy sunflower)	2	1	.25	97	60	20
Helianthus occidentalis (Western sunflower)	2	1	.25	97	60	10
Heliopsis helianthoides (Ox-eye sunflower)	2	1	.25	97	60	20
Lespedeza capitata (Round-headed bushclover)	2	1	.25	97	60	10
Liatris aspera (Rough blazing star)	5	1	.25	95	60	10
Liatris pycnostachya (Prairie blazing star	5	1	.25	95	60	10
Lupinus perennis (Lupine)	2	1	.25	97	60	60
Monarda punctata (Horsemint)	2	1	.25	97	60	10
Monarda fistulosa (Bergamot)	2	1	.25	97	60	10
Parthenium integrifolium (Wild quinine)	10	1	.25	90	60	20
Petalostemum candidum (White prairie clover)	2	1	.25	97	60	10
Petalostemum purpureum (Purple prairie clover)	2	1	.25	97	60	10
Ratibida pinnata (Yellow coneflower)	2	1	.25	97	60	10
Rudbeckia hirta (Black-eyed Susan)	2	1	.25	97	60	10
Rudbeckia subtomentosa (Sweet black-eyed Susan)	15	1	.25	85	60	50
Silphium integrifolium (Rosinweed)	15	1	.25	85	60	100
Silphium laciniatum (Compass plant)	15	1	.25	85	60	70
Silphium terebinthinaceum (Prairie dock)	2	1	.25	97	60	10
Solidago rigida (Stiff goldenrod)	2	1	.25	97	60	10
Solidago speciosa (Showy goldenrod)	2	1	.25	97	60	10
Verbena stricta (Hoary vervain)						

Noxious weed seeds allowed – none

* = with appendages

LABELING

A. The certified source-identified seed label shall contain the following information:

1. Class of certified source-identified seed
2. Species common and scientific name
3. Purity information including: the percentage by weight of pure seed, inert material, weed seeds and seed of other species
4. Lot number
5. Percentage of germination exclusive of dormant or hard seed and the percentage of dormant or hard seed
6. Original geographic location of G_0 (native stand) collection site for all seed regardless of generation
7. Production field geographic location

B. The producer, collector or vendor, whose name appears on the seed container guarantees to the buyer that the tag attached to the seed is an accurate representation of the entire lot of the seed and that the lot has been inspected by the official seed certification agency and conforms to the published standards of that agency.

SEED CONDITIONING AND PRODUCTION RECORDS

All grower records and facilities involved in receiving, cleaning, storage, labeling, shipping or other functions of the certification process shall be available for inspection by the WCIA during normal business hours.

It is the responsibility of each producer of certified seed to maintain an accurate record of all sales of certified source-identified seed, including the name and address of the purchaser, amount and species/genotype of seed sold and the date.

REJECTION OF SEED LOTS

The seed certifying agency will reject for certification, any lot of source-identified seed which is questionable as to source-identity, and any lot which does not meet the certification standards of WCIA for mechanical and species purity.

VIOLATIONS

The penalty for providing false information or collecting seed and/or digging plants on state or private land without permission is the loss of certification privileges now and in the future.

DEFINITIONS

GENOTYPE – the entire genetic constitution, expressed or latent, of an organism.

INERT MATTER – broken or damaged seeds one-half or less their original size, undeveloped weed seeds without embryo or endosperm and any matter other than seeds, i.e. sand, stones, dirt, sticks, pods, chaff.

NATIVE STANDS – production sites which have never been tilled.

NOXIOUS WEEDS – weeds which are listed as prohibited and restricted by state statutes.

NURSERY PLANTING – monoculture of native plant species grown for the specific purpose of seed or plant multiplication.

OTHER CROP – other native species or domesticated crops.

PERCENT GERMINATION – percentage of pure seed that will produce normal seedlings in seed laboratory tests.

PURITY – percent by weight of pure seed (100% minus the percentages of inert matter, weed seed and other crop).

ROGUE – systematic removal of individuals or families of undesirable genotype or other species.

SOURCE-IDENTIFIED – plants or seeds that are not genetically improved but are guaranteed as to source of geographic origin.

UNCONDITIONED SEED – seed in its harvested state prior to being put through the cleaning process.

WEED SEED – includes seeds of any plant commonly known as a weed but not designated as prohibited or restricted noxious.

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