

The following information is from 3 versions of a handout by Ray Schulenberg of the Morton Arboretum. PDFs of the originals are available on request.

NOTES	1st handout The following methods were used for growing and establishing prairie plants at the Morton Arboretum, 1963-1967. In all cases plantings were made in weedy old farm land; the ground was plowed at least half a year previous to planting, was later disked, and finally was rototilled just before planting.
ON THE	
PROPAGATION	3rd handout, 7.Feb.72 The following methods were used in prairie restoration at the Morton Arboretum in the years 1963-1971. The rationale of the project was to build a self-maintaining community of locally native prairie plants in weedy old farm land. In all cases the ground was plowed at least half a year previous to prairie planting, and was disked up to the time of planting to reduce weed infestation. No information was available to the writer as to soil classification, pH, nutrient levels, etc.; therefore no attempt was made to improve the field soil by lime, fertilizers, etc. Likewise, no attempt was made to sterilize the field soil by heat or chemicals, and no chemical herbicides were used. Except for occasional use of a watering can when transplanting, there was no irrigating in the field.
OF	
PRAIRIE	
PLANTS	<u>Seed sources.</u> With very few exceptions, prairie propagation at the Morton Arboretum was done by use of seed rather than by vegetative means. Again with negligible exceptions, the seed was collected locally from spontaneous populations, almost all within 50 miles of the Arboretum.
17.Nov.67 rfs revised 7.Feb.72	<u>Collecting and cleaning seed.</u> Our seed was collected by our own trained personnel or by trusted colleagues; this is no job for boy scouts. The seed of each species is collected when the fruits are mature and begin to shatter. It is dried in shade, without artificial heat or other aid, and is cleaned by use of screens, emery blocks, and other equipment as the plant material requires. We constructed a set of large, nesting, rectangular sieves for this use, each sieve with a different mesh size. Winnowing is regularly used to get rid of chaff and dust. However, if the seed is not to be sown with a drill, it need not be completely separated from other plant parts. The clean seed can be stored dry at room temperature, or preferably in a cooler place until time for cold damp storage.
	1st handout Method SEEDLINGS GROWN IN GREENHOUSE #1
	<u>Processing the seed.</u> Seed is collected as soon as mature, is cleaned by the use of sieves, and is stored dry. Before the first of February the seed is "stratified": by being mixed with at least an equal volume of damp beach sand and placed in a polyethylene bag, which is firmly tied shut and placed in a refrigerator kept between 32 and 38 degrees Fahrenheit.
	<u>Sowing the seed.</u> About the first of April the seed is sown (along with the sand) in flats of sterilized soil; the flats are then set in a vat of water until surface of soil shows moisture, then set on greenhouse bench and covered with wrapping paper. Greenhouse temperatures are usually between 50 at night and 80 on the brightest days. When the seedlings emerge, paper is removed. Legume seeds are inoculated with Nitragin just before sowing.

Banding the seedlings. When seedlings have true leaves and strong enough roots, they are transferred, singly or in small tufts into wood veneer plant bands in other flats, again in sterile soil. When filled, these flats too are watered the first time by being set in a vat of water; later watering is by sprinkler nozzle.

Transplanting to the field. When the seedlings are well established in the bands, and when frost danger is past outside (usually around May 15), the plants are transplanted with a trowel, band and all, into freshly tilled soil in the field that is to become prairie, at a spacing of one band per square foot.

Achieving a mixture. Mixture of prairie plants can be achieved at any one or more of the above steps: when the seed is collected, stored, stratified, or sown --or when the seedlings are banded, or even when they are transplanted to the field. In any case it is wise to have at least one vigorous plant of a warm-season grass in each square foot of field; this is to give competition to weeds and to provide fuel for fire.

Weeding the planting. It is necessary to weed between these plants through the first growing season. This can be done by walking among the prairie plants (but not when the ground is muddy) and pulling individual weeds or cutting them out with a linoleum knife.

Use of fire. Regardless of the method used in establishing prairie, burning the dry plants as they stand in the field has proved to be extremely useful in fighting weeds. March 21st is about the best time, since a fire at this time does little harm to prairie plants but controls weeds effectively. Delaying the fire until this time conserves soil and water and provides wildlife habitat through the winter; this delay also lets many weeds start spring growth, becoming highly vulnerable to fire. Burning at a later date does more damage to prairie plants. Fire is dangerous and should be used only with great caution; burning should not be attempted on windy days. We have not used flame-throwers or additional fuel, but rather have let the prairie burn naturally after being ignited by a match.

Method #1 has these advantages: It requires very little seed; it gives prairie plants a headstart over weeds; it allows full control over location of each plant; it allows weed control by relatively untrained help. Its disadvantages are: a tremendous input of time, effort, facilities, and materials for raising the seedlings and transplanting them; also the resulting prairie will have an artificial look for years or decades.

Method SEED SOWN IN FIELD IN SPRING

#2

Broadcast seeding. Seeds are handled as with Method #1, but instead of being sown in flats in April, they are sown directly in their permanent home in the field in May. Before being sown, the various seeds (together with the sand in which they were stratified) are mixed together; if there are legumes the proper strains of Nitragin are added at this time. Then this mass is mixed with at least twice its volume of dry Terralite; this operation makes possible a more uniform distribution. This mixture is then broadcast by hand evenly over the field. Then the surface of the soil is raked lightly and the entire area is rolled with a lawn roller. Rates of seed distribution are indefinite because of presence of chaff, differences between seeds of various species, etc. A suggested minimum rate is about 4 quarts of seed mixture (before Terralite) to 1000 square feet. This would be more than five bushels to an acre. At least half the seed by volume should be warm-

season grasses.

Weeding the broadcast planting. We regularly weed a seeded field the first time by squatting or kneeling on a plank and pulling or cutting the weeds individually from among the prairie seedlings. By far the best tool we have found for this operation is a linoleum knife, kept sharp by frequent use of a file. Weeding this kind of a planting, where many kinds of prairie seedlings are intricately mingled with many kinds of weeds, requires a great deal of botanical knowledge, good eyesight, and strong character. The second weeding of the summer can be accomplished from a standing position, without a plank.

Method #2 has the advantages of producing a far more natural-looking prairie than Method #1, and of eliminating all the tedious and expensive operations of growing seedlings in flats and transplanting them. Its disadvantages are that it requires much more seed to cover a given area, and for the weeding operation requires workers who are careful and highly trained.

Method

#3

Fall seeding with "seed hay." Late October is the usual time for this operation. Prairie seeds are collected rapidly and indiscriminately by stripping or clipping off entire inflorescences of whatever is ripe; the mixture is trampled in a large tub or on a dropcloth, and then scattered (stems, leaves, and all) over the freshly tilled ground. It is raked in lightly, and receives no further attention until spring.

Weeding. The same weeding procedure is used as with method #2, but with Method #3 the weed threat is much worse. Most prairie seeds do not germinate until May, but in the meantime many weeds seeds are germinating in fall and early spring, so that by May there is already serious competition. Therefore this method requires earlier, more laborious, and more frequent weeding.

Method #3, because of the mulching effect of the "hay", is useful on ground that is subject to severe erosion. It has the further advantages of being done in the fall (when time is not in such desperately short supply), and of requiring almost no handling of the seed (i.e. no cleaning, storing, or stratifying). The worst disadvantage is the weed problem mentioned above. Also, one cannot accurately estimate the quantity of actual seed in a given batch of the mixed hay, nor the proportions of the various seeds within it. Thus it is wasteful of seed, and gives unpredictable results. The mixture necessarily contains late-maturing species.

2nd handout

Cold damp storage (stratification) of seed. Experiment here and elsewhere has shown that seeds of most prairie species germinate better (and in some cases only) if they have been stored cold and damp for a while. (This is the procedure long known to nurserymen as "stratifying", this word referring to the old procedure of storing seeds in layers between layers of damp sand in boxes or pits.) Certain chemical changes take place in seeds exposed to low temperatures and moisture, which enable the embryos to "break dormancy" and resume growth. This process is used for most of the prairie plants which mature their seed in summer or fall; it is not used for some seeds which mature in spring or early summer, which should be planted in soil as soon as collected.

The cold damp storage treatment is very simple: Our standard procedure has been to mix the seed with at least an

equal volume of damp fine sand (silica sand or beach sand) and put the mixture in a polyethylene bag which is tightly closed and placed in a refrigerator kept approximately between 32 and 38 degrees Fahrenheit. A two-month treatment is adequate for most seeds, and therefore we usually start treatment about the first of February for planting in the greenhouse the first of April; this operation can be delayed for spring broadcast or drilling. Seeds should not be stored damp and cold too long, however, as they slowly lose their viability.

SEEDLING TRANSPLANT METHOD. (The procedures as described apply to a situation where a greenhouse is available; if a greenhouse is not available, all operations are adaptable to outdoor conditions, but should be delayed a few weeks.)

Sowing the seed. For greenhouse operations the stratified seed is sown about April 1, along with the sand with which it was stored, in flats (shallow wooden boxes). The flats are first nearly filled with soil that has been sterilized (preferably by heating) to kill the weed seeds. The prairie seeds should be sown shallowly; in most cases it is sufficient just to press them into firm contact with the surface of the soil with a block of wood, and then lightly sprinkle the surface with loose soil. (various kinds of artificial soil mixes, sphagnum, etc., can be used; we regularly use steam-sterilized field soil.) The flats are then set in a shallow vat of water and soaked until moisture appears on the surface; not flooded! Then the flats are gently set on the greenhouse bench and covered with wrapping paper to retain moisture. Greenhouse temperatures at this time are usually kept between 50 degrees at night and 80 on the brightest days. When the seedlings begin to emerge, the paper should be taken off, but the seedlings should still be protected from intense heat by shading the greenhouse on hot days. After the first watering in the vat, the flats are watered when necessary by sprinkler nozzle on a hose or can.

Inoculating legumes. Most prairie members of the family Leguminosae thrive better if certain bacteria (in the genus Rhizobium) are living symbiotically on their roots. These bacteria can be obtained in cultures under the trade name Nitragin; the cultures are ordered according to the legume species, from Nitragin Sales Corporation, 3101 West Custer Avenue, P. O. Box 6186, Milwaukee, WI 53209. The usual procedure is to mix the Nitragin with the seeds just before sowing; by this method there seems to be some danger of over-inoculation, because of the small quantity of seed usually used. As an alternative, we often mix the Nitragin with the soil used for banding the seedlings in the operation described below. For SPRING BROADCAST or DRILL, the Nitragin is mixed freely with the seed just before sowing in the field.

Banding the seedlings. When the seedlings have true leaves and the roots are strong enough to survive handling, the seedlings are transferred, singly or in small tufts, into wood-veneer plant bands in other flats, again in sterile soil. (In recent years these plant bands have been hard to get, and some workers are using peat pots, preferably in strips, in essentially the same way as the bands.) It is important to firm the soil well around the seedlings; the band should be well filled with firm soil, with the seedling standing just a little deeper than they were in the seed flat. When filled, these flats are set in a vat for their first watering, then set on the greenhouse bench.

Achieving a mixture. Up to this point we usually keep the seeds and seedlings separated as to species. If the plants are to be used in designed landscapes, experimental or display plots, etc., they may be kept separated, but usually we mix them after they have been banded, because we are trying to create a diverse community, simulating the original prairie. Our usual procedure, when the earth in the bands holds together so they can be handled, is to transfer the bands again to other flats, lining them up in longitudinal rows, one species per row, with natural associations in a given flat (depending on weather the flatful is to be planted in a moist, mesic, dry, or sandy place in the field). In any flat, there should be more warm-season grasses than the total of forbs and cool-season grasses. Note: We have tried many variations of these

operations, such as (a) planting pinches of mixed seed directly in bands, and (b) banding seedlings of two or more species in the same band; there is no "right" or "best" way.

Transplanting in the field. If seedlings have been raised in April in the greenhouse, they are ahead of normal growth for the season and tender to frost; therefore transplanting in the field should be delayed until danger of frost is past. Unfortunately the date of last frost varies about a month. We usually take some risk and begin transplanting about the middle of May.

The field soil should be freshly tilled, preferably by a roto-type machine, and thus free of growing weeds, and should be fairly smooth, free of clods, and moist but not muddy. The workers kneel or hunker on a plank (so as to distribute their weight and not compact the soil); the plank also supports flats of mixed seedlings. We have built a special planting plank 2' x 10' with a pair of lifting handles at each end, an angle-iron protruding into the ground around the perimeter, and bolts sticking into the ground in the center of each of the 20 square feet. Using a trowel, the worker plants one band in each square foot, making sure the bottom of the soil in the band is firmly pressed by moist soil in the hole. Nevertheless, there should be a covering of rough, loose soil on the surface at the right level for the plant.

Weeding the planting. Taking care to stay out of the planting when the soil is muddy, the workers can walk through the banded planting with a sharp hoe and slice off the weeds between the prairie plants; if the weeds are sparse, they can be removed by a combination of pulling and cutting below the crown with a sharp, hook-bladed linoleum knife. Normally a banded planting has to be weeded two to three times during the first growing season (in May or June). If the planting and this early weeding are carried out successfully, there is rarely any further maintenance except by fire.

Use of fire. Regardless of the method used in establishing prairie, burning the dry plants as they stand in the field has proved to be extremely useful in fighting weeds, preventing woody invasion, and promoting good health and long life for all the prairie plants. In the Chicago region the best time for fire seems to be between March 20 and April 10; fire at this time does little harm to prairie plants but controls weeds effectively. Delaying the fire until this time conserves soil and water and provides wildlife habitat through the winter; this delay also lets many weeds start spring growth, becoming highly vulnerable to fire. Burning at a later date could damage prairie plants. We have not used flame-throwers or additional fuel, but rather have let the prairie burn naturally after being ignited by a match. We try to burn a new planting in the spring when it has first become dense enough to sustain fire, and thereafter in alternate years. A portion of our total project is thus left unburned each year for maintaining populations of insects and other prairie organisms which winter at or above the soil surface. Fire is dangerous and should be used only with great caution; burning should not be attempted on windy days. In certain areas open burning of this kind is now restricted by the pollution Control Board and Environmental Protection Agency.

Evaluation of the SEEDLING TRANSPLANT method. Prairie establishment with seedlings transplanted from the greenhouse has these advantages: It requires very little seed. It gives prairie plants a head start over weeds. It allows full control over the location of each plant and thus of initial composition of the community. It spaces the plants in regular patterns allowing almost mechanical weed control, even by relatively untrained helpers.

The method has these disadvantages: It requires a tremendous input of time, effort, expensive greenhouse space, and specialized materials and equipment. The resulting prairie has an artificial look which will persist for years or decades.

SPRING BROADCAST

Sowing in field. Seeds are processed as with the TRANSPLANT method, but instead of being sown in flats in April, they are sown directly in their permanent home in the field in May or June. (Perhaps by coincidence, several plots planted on May 12 of various years are among our finest prairie plantings.) However, with luck in regard to rainfall, one can succeed with Spring Broadcast as late as July!

Before being sown, the seeds of several species (together with the sand in which they were stratified) are mixed together in desired proportions. About half the total volume should be that of warm-season grasses. If there are legumes, the proper strains of Nitragin are added at this time (see Inoculation above). Rate of seed distribution is hard to estimate, because of size differences, soil condition, etc. A suggested rate is about four quarts of seed-sand mixture to 1000 square feet; handled in larger lots, about four bushels will plant an acre.

However, before actual broadcast begins, this mixture should be diluted with at least twice its volume of dry Terralite; this addition makes possible more uniform distribution because of the bulk and high visibility of the Terralite. Perlite or other chemically inert dilutants can be used just as effectively. The final mixture is scattered thinly and evenly over the field, and then, before the seed can dry out, the surface of the soil is raked lightly, and the entire area is rolled with a lawn roller to bring the seed into contact with moist soil. Most seeds that have been stratified germinate shortly after being sown in warm weather; if they do not receive enough moisture to sustain life when they germinate, they die. Having no facility for sprinkler irrigation, we have lost many acres of seeding because the ground was too dry at time of seeding, and the rain did not come soon enough.

To avoid the risk of losing the whole planting because of drying out, one can plant unstratified, i. e. dry-stored seed; but usually the percentage of emergence from unstratified seed is very low, except with commercially produced grass seed.

Weeding the broadcast planting. We regularly weed a seeded field the first time by hunkering or kneeling on a plank (usually a heavy plywood 1' x 10') and pulling or cutting the weeds individually from among the prairie seedlings. By far the best tool we have found for this operation is a hook-bladed linoleum knife, kept razor-sharp by frequent use of a pocket whetstone. The weeders proceed through the field on strips sharply marked by taut cords. Weeding this kind of planting, where many species of prairie seedlings are intricately mingled with many kinds of weeds, requires a great deal of botanical knowledge, good eyesight, and strong motivation. The second weeding of the summer can be accomplished from a standing position, without a plank; weeds are often so tough at this stage that a small pruning shears is used. A successful early seeding often forms a stand capable of sustaining fire by the end of the first growing season, and needs no weeding the next year; a later or less successful seeding will not be able to carry fire the next spring, and will still need weeding that spring.

Evaluation of the SPRING BROADCAST method. This procedure gives a far more natural-looking prairie than the Seedling Transplant method, and requires relatively little input of time, effort, equipment, or facilities. Its disadvantages are: It requires (and wastes) a great quantity of seed to cover a given area, since a high percentage of seed is covered too shallowly if at all, and some gets in too deep. Furthermore, for the weeding operation it requires reliable, highly-trained workers, and a tremendous number of man-hours.

A modification of Spring Broadcast: Hand sowing in rows. To economize on seed and to simplify weeding, one can modify the Spring Broadcast method by sowing the seed in rows marked by a taut cord--up to 18" apart. This operation is the same as planting radishes or lettuce in the kitchen garden. The worker marks a row by digging a shallow trench with a

hoe, scatters the mixed seed in the row, and (sic) by foot or with a roller.

This method leaves no question as to where the prairie plants are. Its main disadvantage is that the rows may persist for decades, creating an unnatural-looking "prairie". Also, it tends to place plants of the more delicate prairie species under too close competition from their stronger neighbors.

FALL BROADCAST

Seed collecting and sowing. This operation has been very successful in cases where a strip of prepared field is adjacent to a strip of established prairie. Late October is the usual time. Prairie seeds are collected rapidly and indiscriminately by stripping or clipping off entire inflorescences. This material is mixed and trampled on a dropcloth or in a large tub, and then scattered (stems, leaves, and all) over the freshly tilled ground. This "seed hay" is mixed with the soil by light raking, and receives no further attention until the next spring, since dormancy requirements are met by natural weather factors.

Weeding. The same weeding procedure is used as with Spring Broadcast, but in the case of Fall Broadcast the weed threat is much worse. Most prairie seeds do not germinate until May, but in the meantime many weed seeds are germinating in fall and early spring, so that by May there is already serious competition. Therefore this method requires earlier, more laborious, and more frequent weeding.

Evaluation of Fall Broadcast. Because of the mulching effect of the "hay", Fall Broadcast is useful on ground that is subject to severe erosion. It has the further advantage of being carried out at a time of the year when most folks are less busy than in spring. It is fast, requiring almost no handling of the seed (i. e. no cleaning, storing, or stratifying). The worst disadvantage is the weed problem mentioned above. Also, one cannot accurately estimate the quantity of actual seed in a given batch of the mixed hay, nor the proportions of the various seeds within it. Results are thus unpredictable. Also, a mixture collected and scattered as described above contains only late-maturing species; however, certain early-maturing seeds (such as *Stipa spartea*) can be stored dry and added to this fall broadcast to enrich it.

THE NISBET DRILL

Ordinary grain drills, such as farmers use for planting crops, are not adapted to sowing the varied and often light and chaffy seeds of prairie plants. For this kind of seed there is a specially designed machine, the Nisbet Drill, made in San Angelo, Texas. It can be purchased through Mr. Jim Wilson, Wilson Seed Farms, Polk, Nebraska 68654. Mr. Wilson also provides practical advice on the use of the drill. We know of many cases where it has been very successful in establishing stands of major prairie grasses by using commercially produced seed of selected strains of these grasses, such as are also available from Wilson Seed Farms.

There are valid reasons to suspect, however, that at least some of these strains are so aggressive that they may have seriously destructive long-term effects on local prairie remnants. In the Morton Arboretum restoration project we used the Drill only for locally-collected seed, which had been stratified and mixed. These seedings failed, but not because of factors intrinsic to the drill.

VEGETATIVE METHODS

There is a danger that prairie enthusiasts, misled by unrealistic recommendations in literature, may dig up wild prairie plants expecting them to reproduce by cuttings, divisions, or other vegetative means, as readily as do common garden perennials. Actually only a few prairie plants are known to have the capacity for successful response to these standard horticultural procedures. In general plants which quickly form large vegetative colonies by rhizomes can be increased by digging and transplanting (from a nursery bed or restoration) rooted shoots. This is also true of plants which form many-

stemmed clumps, from which you can separate shoots with associated roots. Bulb-forming plants such as Allium cernuum can be thus divided with great success.

Even where vegetative increase is possible, it is not as desirable as increase by seed; seed yields genetically diverse populations of a given species while vegetative methods yield genetically uniform clones.

SODS or "plugs" dug from remnant prairies. This method is a crude variation of vegetative propagation, which is justified only as an emergency salvage operation when a prairie remnant is actually being destroyed and cannot be saved in situ. When the Northern Illinois Gas Company destroyed a prairie remnant at the east end of the Morton Arboretum in summer of 1964, we salvaged a few sods and planted them in two strips in the restoration area. Many of the higher-quality prairie plants died out quickly, and the strips became very weedy because of weeds already present in the sods. A notable and desirable increaser after this operation is the highly rhizomatous Comandra richardsiana; it is conceivable that a few species can be perpetuated only by digging, because of mycorrhizal or parasitic requirements.

Combined versions introduction

The following are some plants of Chicago-region prairies, with notes based on propagation experiences with each, based on work done 1963-1967 at the Morton Arboretum, Lisle, Illinois. Nomenclature is that of GRAY'S MANUAL, 8TH EDITION. Abbreviations are intended to be self-explanatory. Ecology and phenology are for Chicago region only. Cultivation data are based on work done 1963-1967 at the Arboretum. Plants are long-lived perennials unless otherwise noted. Heights are estimated average for mature inflorescence of cultivated plants.

Combined versions information. (Identical information in the 1st four columns is not listed.)

Species	Kind of prairie	Time & COLOR of flower	Time of sd harvest	Height of plt, propagation methods, special problems, ornamental values, etc. Propagation methods, special problems, performance, etc.
Allium cernuum	moist to mesic	late Jul to late Aug, PALE PINK	Oct	1/1/2'; easy by method #1, blooming 2nd yr; a reliable garden plant, forming clumps. Poor results in field seeding. Easy by SEEDLING TRANSPLANT; fls 2nd yr; self sows freely, once established.
Amorpha canescens	mesic to dry	late Jun to mid Jul; DEEP PURPLE	Oct	2'; shrub blooming on new wood, thus like perennial. Sdls die in flats, do poorly in field seeding. Need inoculation. leguminous shrub, with fls on new wood. Grows slowly first few years. Success with SEEDLING TRANSPLANT and SPRING BROADCAST.
Andropogon gerardii	moist to dry; general	Aug to early Sep; STAMENS MAROON	Oct	6'; all methods work; blooms 1st yr if sown early. Slowly forms large sods. An essential warm-season grass; good fall color. Best-known prairie grass, warm-season, successful by ALL METHODS. Strong competitor; delicate forb seedlings may be overwhelmed.
Andropogon scoparius	mesic to dry	mid Aug to mid Sep; STA. MAROON	Oct	3'; culture as above, but not sod-forming. Has best fall color of any prairie plant.

				Warm season grass, successful by ALL METHODS. Excellent fall color; fls 1st yr.
Anemone canadensis	moist to mesic	late May to mid Jul; Aug-Sep	PURE WHITE	1 1/2'; percent of germination very low, but rapidly forms large vegetative colonies. Only method #1 tried. Three SEEDLING TRANSPLANTS of 1964 have become a vegetative colony of many square rods.
Anemone cylindrica	mesic to dry	mid Jun to mid Jul; Oct	GRNISH WHITE	2'; easy by method #1; no results from other methods. Blooms 2nd yr. Successful by SEEDLING TRANSPLANT; no results from other methods to date. Fls 2nd yr.
Anemone patens wolfgangiana	dry hill tops	April; PALE VIOLET	Jun	8"; plt sds while fresh, transplant next spring; fls following spring. Susceptible to spring fire, needs small neighbors. Sds should be planted while fresh; emergence occurs same season. Susceptible to spring fire, needs neighbors of low fuel content.
Asclepias hirtella	mesic, dry, esp. sandy	late Jul, early Aug; GREENISH	late Sep	2'; only method #1 tried; sdlg weak 1st & 2nd yrs, bloom 3rd year. Only SEEDLING TRANSPLANT method tried; seedlings weak first two years; fls 3rd yr.
Asclepias meadii	mesic	Jun; GREENISH	Aug	We have only 2-yr sdlgs, raised by method #1; sdlgs very weak, have not bloomed. Sd from Missouri.
Asclepias sullivantii	moist to mesic	Jul; PINK	Oct	3'; method #1; sdlgs weak 1st yr, bloom 3rd yr. Does well in garden, foliage and fls attractive. Seedlings easy to raise and transplant, but usually seem to be out-competed in restoration plots; good as a garden plant.
Asclepias tuberosa	dry, esp. sandy	late Jun to late Aug; ORANGE	Oct	2'; easy with method #1, a few plts flowering late the 1st yr, all the 2nd. Reliable garden ornamental. Successful by SEEDLING TRANSPLANT. often blooming late in the 1st yr.
Asclepias viridiflora	mesic to dry or sand	late Jun to mid Jul; GREENISH	early October	1 1/2'; method #1, sdlgs very weak 1st year, begin bloom 3rd. Shoots come up <u>late</u> each spring; true of most Asclepias. SEEDLING TRANSPLANT; sdlgs very delicate first 2 yrs, begins to fl the 3rd. Shoots come <u>late</u> each spring.
Aster azureus	mesic to dry or sand	early Sep to mid Oct; PALE VIOLET-BLUE	late Oct	Over 3' and coarse unless given competition; methods #1 & #3. Blooms late 1st yr.

				Fls late 1st year by SEEDLING TRANSPLANT. Also successful by FALL BROADCAST.
Aster ericoides	general	late Sep; WHITE	late Oct	2', seed seems to germinate poorly, but when established plt is rather weedy, forming vegetative colonies. I've got poor germination by SEEDLING TRANSPLANT; but plants are aggressive, forming large vegetative colonies.
Aster laevis	moist to mesic	early Sep to early Oct; MED. VIOLET-BLUE	late Oct	3' or more unless given close competition; easy by methods #1 and #2. Blooms late 1st yr. Easy by SEEDLING TRANSPLANT and SPRING BROADCAST. Transplanted seedlings fl 1st yr. Freely self sows.
Aster ptarmicoides	dry hill or sand	early Aug to mid Sep; WHITE	early Oct	1 1/2'; methods #1 and #3. One of the best prairie asters for the dry garden. Successful by SEEDLING TRANSPLANT and FALL BROADCAST. A neat, small plant desirable for use in a dry garden.
Aster sericeus	mesic to dry hill	mid Sep to early Oct; BRIGHT VIOLET	mid Oct	1 1/2, very easy by method #1, blooming late 1st yr. Foliage highly ornamental. Very easy by SEEDLING TRANSPLANT, with fls 1st yr. Foliage highly ornamental.
Baptisia leucantha	general	mid Jun to early Jul; Sep - Oct WHITE		Foliage 2 1/2', infl. to 4'; method #1. Inoculate. Some sdgls damp off. Shoots come up late in field. <u>Legume.</u> Successful by SEEDLING TRANSPLANT, and by SPRING BROADCAST. Shoots come up <u>late</u> each spring.
Baptisia leucophaea	mesic to dry	mid May to early Jun; CREAM	Sep - Oct	1 1/2'; methods #1 & #2, inoculate, some sdgls damp off. Shoots come up late. Foliage exquisite; one of best for garden use. <u>Legume.</u> Successful by SEEDLING TRANSPLANT and SPRING BROADCAST. An exquisitely beautiful plant at any stage.
Bouteloua curtipendula	dry	early Aug; STAMENS SCARLET	early Oct	2;' methods #1 & #2; blooms late 1st yr. Highly ornamental bunch grass, though with little fall color. Successful by SEEDLING TRANSPLANT and SPRING BROADCAST. Highly ornamental structure, though fall color is drab; fls 1st yr.
Bromus kalmii	general, alkaline	Jul; spikes furry	early Oct	2'; easy by methods #1 & #3; #2 not tried. No fall color, little fuel. Must be carefully distinguished from weedy bromes.

				Successful by SEEDLING TRANSPLANT, SPRING BROADCAST, and FALL BROADCAST. Cool-season; no fall color, little fuel; fls 2nd yr.
<i>Cacalia tuberosa</i>	moist to mesic	late Jun, early Jul; WHITE	late Jul	2'; method #1, but germination low; blooms 2nd yr. Buds are attractive. Successful by SEEDLING TRANSPLANT, with fls 2nd yr. A quality plant, most attractive while in bud.
<i>Carex bicknellii</i>	mesic	late May; CREAM	Jul	2', method #1; booms 2nd yr. Not a grass substitute; makes little fuel. SEEDLING TRANSPLANT; by this method forms thick, long-lived clumps, but in nature is sparsely scattered; fls 2nd year.
<i>Castilleja coccinea</i>	moist to dry	late May	late Jun	I have established it only by scattering fresh seeds on established restored prairie. Annual or biennial.
<i>Castilleja sessiliflora</i>	dry sand	Jun	Aug	Perennial. As with <i>C. coccinea</i> , I have established it only by scattering fresh seed in our artificial sand barren.
<i>Ceanothus americanus</i>	mesic to dry, sand	late Jun to late Jul; WHITE	SEP	2'; method #1, but germination low; desirable shrub blooming on new wood, but in cult plts die unpredictably. SEEDLING TRANSPLANT. A shrub which blooms on new wood. Fruits explode, so time of sd collection short.
<i>Cirsium hillii</i>	dry to mesic	late Jun; PURPLE	late Jul	1 1/2'; easy by method #1, but plts in cult are short-lived, susceptible to aphids; blooms 2nd yr, then dies.
<i>Comandra richardiana</i>	general	late May, early Jun	Aug?	Have raised a few by sowing strat. sds in flat with banded grasses. Spreads from salvaged sods.
<i>Coreopsis palmata</i>	mesic	late Jun to late Jul; YELLOW	Nov	1 1/2'; easy by method #1, blooming 2nd yr; forms compact vegetative colonies. A reliable garden plt; foliage turns black in fall. SEEDLING TRANSPLANT. Fls 2nd yr. Forms compact vegetative colonies. Foliage turns black in fall.
<i>Coreopsis tripteris</i>	general	mid Aug to mid Sep; YELLOW	Nov	5'; easy by methods 1, 2, & 3; blooms 2nd yr. Successful by SEEDLING TRANSPLANT, SPRING BROADCAST, and FALL BROADCAST; fls 2nd yr.
<i>Desmodium canadense</i>	mesic	Jul-Aug; PURPLE	early Oct	3 1/2'; easy by methods #1 & #2, blooming 2nd yr. Inoculate. Fruits stick to clothes. Successful by SEEDLING TRANSPLANT and SPRING BROADCAST; legume. Fls 2nd yr. Fruits stick to clothes.

Desmodium illinoense	dry	Jul; PALE PINKISH PURPLE	Sep	4 1/2'; easy by methods #1 & #2, blooming 2nd yr; inoc. Fruit sticks to clothes. Too coarse except by meth.2, much grass. Legume. Successful by SEEDLING TRANSPLANT and SPRING BROADCAST. Fls 2nd yr. Fruits stick to clothes.
Dodecatheon meadia	general; also woods	early May to early Jun; PINK	Aug to Oct	1'; method #1, but cotyledons only 1st yr; blooms 3rd or 4th; sensitive to spring fires. A gratifying garden plant. SEEDLING TRANSPLANT, but early growth very slow; fls 3rd or 4th yr.
Echinacea pallida	mesic to dry	late Jun & early Jul; PURPLE	Nov!	2 1/2'; all methods successful; blooms 2nd yr. Too coarse without competition. Rodents eat roots. Achenes tight in heads till Nov. Successful by SEEDLING TRANSPLANT, SPRING BROADCAST, FALL BROADCAST. Too coarse without competition. Fls 2nd yr.
Eryngium yuccifolium	moist to dry;general	early Jul to early Aug; WHITE	late Oct	4'; easy by method #1, blooming late 1st yr; gets coarse & tall. Try with method #2 with much grassy competition. SEEDLING TRANSPLANT, SPRING BROADCAST; reseeds freely once established. Fls 2nd yr.
Euphorbia corollata	mesic to dry & sand	mid Jun to mid Sep; WHITE	early Sep	2'; method #1, blooming 2nd yr. Sd hard to get because fruit explodes on ripening. Successful by SEEDLING TRANSPLANT; fls 2nd yr. Sd hard to get because fruit explodes upon ripening.
Galium boreale	mesic	late Jun, early Jul	Aug	SEEDLING TRANSPLANT; spreads rapidly by long rhizomes, but is not weedy.
Gentiana andrewsii	moist	early Sep to mid Oct; BLUE	Nov	1 1/2'; method #1, but sdgls spent full yr in sd flat; bloom 3rd yr. SEEDLING TRANSPLANT; the easiest of the gentians.
Gentiana flavida	moist to mesic	early Sep	late Oct	SEEDLING TRANSPLANT; ours flowered abundantly the 3rd yr.
Gentiana puberula	mesic to dry	mid Sep to early Oct; DEEP BLUE	Nov	1'; method #1, but sdgls very delicate, usually die; survivors bloom 4th yr. Needs short but close competition. Beautiful. SEEDLING TRANSPLANT; needs better care in early sdlg stage than I gave it.

Geum triflorum	dry hill	late Apr & early May; RED SEPALS PINK PETALS	Jun	1'; method #1, or sow seeds as soon as collected. Sensitive to spring fires; can thrive in poor soils without grass. Successful by SEEDLING TRANSPLANT. Best planted with small neighbors to avoid excessive damage by fires; fls 2nd yr.
Helianthus laetiflorus rigidus	general	late Aug to mid Sep; YELLOW	Oct	3'; all methods work too well; soon forms large colonies by rhizomes; needs tight competition. SEEDLING TRANSPLANT. Very aggressive at first, but when community mature, is no problem. Rhizomatous. Fls 1st yr.
Helianthus mollis	dry	Aug; YELLOW	Oct	3'; all methods work well; fls late 1st yr. Foliage attractive and fls large; sds especially liked by goldfinches. SEEDLING TRANSPLANT, SPRING BROADCAST. Aggressive at first and highly rhizomatous, but not weedy in long run. Fls 1st yr.
Helianthus occidentalis	dry & sand	early Aug to mid Sep; YELLOW	Oct	3'; all methods work well; too coarse 1st yr, blooming late; levels off later, forming colonies by rhizomes. SEEDLING TRANSPLANT. Fls 1st yr, and rapidly forms large vegetative colonies; apparently highly allelopathic.
Heliopsis helianthoides	moist to mesic	early Jul to mid Aug; ORANGE-YEL.	Oct	3 1/2'; all methods; fls late 1st yr. Coarse in garden, but no problem in field. SEEDLING TRANSPLANT, SPRING BROADCAST, FALL BROADCAST. Fls 1st yr. Not weedy.
Heuchera richardsonii grayana	general	late may to late Jun; CHARTREUSE	late Jul	2'; method #1 only; sds tiny but emergence good; blooms 2nd yr. Evergreen foliage in tight clump; fine, reliable ornamental. SEEDLING TRANSPLANT only; sdgs small, but growth reliable. Fls 2nd yr.
Hierochloa odorata	moist, alkaline	early May; GOLD	Jun	10", have tried only a few sd, used method #1 successfully. Forms colonies by rhizomes. Desirable for fragrance. SEEDLING TRANSPLANT. Highly rhizomatous, so that VEGETATIVE METHODS are strikingly successful. Desirable for fragrance.
Koeleria cristata	dry, esp. sand	mid Jun to early Jul; Aug PLATINUM		1'; easy by method #1, blooming 2nd yr; inflorescence spectacular. Gives little fuel, little competition to weeds. SEEDLING TRANSPLANT. A cool-season grass which is not very competitive and provides little fuel. Fls 2nd yr.
Kuhnia eupatorioides	dry	late Aug through Sep; CREAM	Oct	2'; methods #1 and #3; too coarse for rich garden soil; good in field with competition.

SEEDLING TRANSPLANT, SPRING BROADCAST, FALL BROADCAST, NISBET DRILL. Fls 2nd yr; slightly weedy farther west.

<i>Lespedeza capitata</i>	mesic to dry; sand; general	mid Aug to early Sep; WHITE & PUR.	late Oct.	3'; methods #1 and #2; sdgls tend to damp off in flats. Inoc. Blooms 2nd yr. Legume. SEEDLING TRANSPLANT, SPRING BROADCAST. By sdg, fls 2nd yr. Sdgls tend to frost-heave first winter.
<i>Lespedeza leptostachya</i>	dry	no notes taken	Oct	2'; little sd available, only method #1 used. Blooms 2nd yr; grows weakly, susceptible to herbicides.
<i>Liatris aspera</i>	mesic to dry & sand	mid Aug to late Sep; PURPLE	Oct	2 1/2'; method #1; blooms 2nd yr. Floppy and gross in garden, needs competition. SEEDLING TRANSPLANT. Fls 2nd yr.
<i>Liatris cylindracea</i>	dry hill or sand	late Aug & early Sep; PURPLE	Oct	14"; method #1; blooming 2nd yr; first yr sdgls have only one linear leaf, are easily lost. SEEDLING TRANSPLANT. Fls 2nd yr, but during the 1st yr the sdgls have only one leaf, can be easily lost in hoeing.
<i>Liatris pycnostachya</i>	mesic	late Jul, early Aug; PURPLE	Oct	3'; method #1; blooming 2nd yr; needs staking in the garden because of excessive growth. SEEDLING TRANSPLANT. Fls 2nd yr.
<i>Liatris spicata</i>	moist to mesic	early Aug to early Sep; PURPLE	Oct	5'; method #1; blooming 2nd yr; needs competition, too coarse and floppy for garden. SEEDLING TRANSPLANT, SPRING BROADCAST. Fls 2nd yr. The most aggressive of the genus.
<i>Lithospermum canescens</i>	mesic to dry	mid May to mid Jun; Jul		ORANGE 10"; sds should be sown while fresh; they are hard to get; sdgls grow weak, usually die. Highly desirable ornamental. SEEDLING TRANSPLANT, but sds should be sown while fresh for emergence next spring. Sds hard to find. Plts grow poorly.
<i>Lithospermum incisum</i>	dry hill or sand	mid May to early Jun; YELLOW	Jul	10"; sds should be planted fresh; sdgls emerge next spring & bloom the following, but plts seem short-lived in cult.
<i>Lythrum alatum</i>	moist & marshes	late Jun through Aug; PURPLE	Sep	1 1/2'; sds tiny, but germinate well with method #1 if flat sits in water; bloom 2nd yr. SEEDLING TRANSPLANT. Sds tiny but do well if sd flat sits in water. Fls 2nd yr.

Monarda fistulosa	general, & other habs.	early Jul through Aug; PALE VIOLET	Oct	3'; easy by method #1, blooming 2nd yr. Almost weedy, but desirable for attracting insects. SEEDLING TRANSPLANT. Fls 2nd yr; rhizomatous and almost weedy, but desirable for attracting insects.
Oenothera pilosella	moist	mid Jun to early Jul; Sep YELLOW		1 1/2'; sd minute, but germinates & grows well by method #1; blooms late 1st yr. Forms mat of short stolons. Plts short-lived? SEEDLING TRANSPLANT. Sds small, but grow well, with fls late 1st yr, and soon forming mats by stolons.
Panicum leibergii	mesic	June? Pistils MAROON	Jul?	8"; sds should be sown while fresh for germination next spring. Blooms late 1st yr. A handsome cool-season grass. SEEDLING TRANSPLANT. Sds should be sown while fresh for emergence next spring. Fls late 1st yr. A cool-season grass.
Panicum virgatum	general	late Jul to mid Sep; inconspic.	Oct	4'; easy by all 3 methods, blooming late 1st yr if sown early. Sd viable 3 yrs. Somewhat coarse for garden use. SEEDLING TRANSPLANT, SPRING BROADCAST, FALL BROADCAST, NISBET DRILL. Fls late 1st year. Sd viable 3 yrs.
Parthenium integrifolium	general	late Jun to early Aug; WHITE	Oct	3'; very easy by methods #1 and #2, blooming late 1st yr by #1. Attractive before and after bloom; a good garden plant. SEEDLING TRANSPLANT, SPRING BROADCAST. Fls late 1st year.
Penstemon pallidus	dry calcareous	late May, early Jun; WHITE	Aug-Sep	14"; method #1, sd small, but does well, blooming 2nd yr. SEEDLING TRANSPLANT. Sd small, but plants do well, with fls 2nd yr.
Petalostemum candidum	mesic to dry	early Jul to early Aug; WHITE	late Sep	20"; sd lgs damp off in method #1; #2 is best, with plts often blooming late 1st summer! Inoculate. <u>Legume.</u> SEEDLING TRANSPLANT, SPRING BROADCAST, and NISBET DRILL. If planted early fls late 1st yr.
Petalostemum purpureum	mesic to dry	early Jul to late Aug; PURPLE	Oct	20"; sd lgs damp off in method #1; #2 is best. Inoculate. A good garden ornamental, no problems after sd lg stage. <u>Legume.</u> SEEDLING TRANSPLANT, SPRING BROADCAST. Fls 2nd yr.
Phlox glaberrima interior	moist	late Jun to early Aug; MAGENTA	Aug	20"; sd hard to get because capsules explode; should be sown while fresh; sd lgs emerge next spring, bloom next. SEEDLING TRANSPLANT. Sd hard to get, as fruits explode. Sow while fresh for emergence next spring; fls next spring.

<i>Phlox pilosa</i>	mesic to dry	mid may to early Jul; MAGENTA	Jul	1'; sd hard to get; see above. The prairie element is early blooming; late dates are a pale sand element. N. B. The prairie element of this plant blooms early; a pale sand ecotype continues much later; SEEDLING TRANSPLANT; see above.
<i>Physostegia virginiana</i>	moist to mesic	early Aug to mid Sep; PINK	Oct	4'; method #1. Blooms 2nd yr. Plts get too tall unless they have close competition. SEEDLING TRANSPLANT, SPRING BROADCAST. Fls 2nd yr.
<i>Polytaenia nuttallii</i>	general	Jun; CREAM	Aug-Sep	2 1/2'; stratify sds 4 months. Rosettes first 2 or 3 yrs; each plt dies after it blooms. SEEDLING TRANSPLANT, SPRING BROADCAST. Stratify 3-4 months. Plants may live as rosettes for many years, always die after seed.
<i>Potentilla arguta</i>	general	early Jul to early Aug; WHITE	Oct	2 1/2'; easy by method #1, even though sds small; blooms 2nd yr; a good garden ornamental, but susceptible to aphids. SEEDLING TRANSPLANT, SPRING BROADCAST. Sds small, but emergence and growth good; fls 2nd yr.
<i>Prenanthes aspera</i>	mesic to dry	Aug; CREAM	Oct	4'; method #1; blooms 2nd or 3rd yr; erratic or intermittent. SEEDLING TRANSPLANT. Emergence and early growth good, but after 8 yrs only a few plts remain.
<i>Prenanthes racemosa</i>	moist to mesic	mid & late Sep; PALE PURPLISH	Oct	4'; method #1; life history in cult as above. SEEDLING TRANSPLANT. As above, except that the plants seem longer lived than <i>P. aspera</i> with us.
<i>Psoralea tenuiflora</i>	mesic to dry	mid Jun to early Jul; early Sep BLUE		20"; method #1, though sdgls tend to damp off. Inoculate; fls 2nd yr. Shoots come up very late in spring. Sds hard to get. Legume. SEEDLING TRANSPLANT. Seed is sparse. Fls 2nd yr. Shoots always emerge very late in spring.
<i>Pycnanthemum virginianum</i>	moist to mesic	late Jul to mid Sep; WHITE	Oct	2'; easy by method #1 though sds small; blooms 2nd yr and is reliable; desirable for fragrance. SEEDLING TRANSPLANT. In recent yrs we find very little sd; fls 2nd yr. The most fragrant of our prairie plts.
<i>Ranunculus rhomboideus</i>	dry hill	late Apr; YELLOW	late May	4"; sd should be sown while fresh; germinates same season & blooms the next spring. Neighbors must be short.

Ratibida pinnata	general	early Jul to mid Aug; YELLOW	Oct	4'; easy by all methods, blooming 2nd yr and reliable. Too big and weedy except in broadcast seeding with close competition. SEEDLING TRANSPLANT, SPRING BROADCAST. Gross and weedy in appearance until the community stabilizes; then no problem.
Rosa carolina	general	late May to mid Jul; PINK	Oct	2'; taxonomically a complex. Most sds do not germinate until 2nd yr; spreads by rhizomes forming loose colonies. (Taxonomically a complex.) SEEDLING TRANSPLANT. Retain sd flat until 2nd spring, when most emergence occurs. Fls on old wood.
Ruellia humilis	dry	mid Jun to late Aug; Sep PALE VIOLET		1'; easy by method #1, blooming 2nd yr; reliable if uninspiring garden plant.
Salix humilis	general	mid Apr to early May; (catkins)	May	2'; sd must be sown immediately, but even then sdls rarely survive. Poor luck with cuttings too. A shrub. Shrub, flowering on old wood. Sds must be sown fresh, but my results poor even then; poor results with hardwood cuttings.
Scutellaria parvula leonardii	dry	early & mid Jun; PURPLISH BLUE	Jul	6"; method #1, blooming 2nd yr; forms colonies by rhizomes which can be divided for propagation. SEEDLING TRANSPLANT. Fls 2nd yr. Extremely well adapted to VEGETATIVE METHODS, namely division of tuberous rhizomes.
Senecio pauperculus balsamitae	moist	late May to late Jun; Jul YELLOW	Jul	1'; method #1, blooming 2nd yr; successful in beds, but has not persisted in field with competition. SEEDLING TRANSPLANT. Fls 2nd yr; rhizomatous.
Silphium integrifolium deamii	general	mid Jul to late Aug; YELLOW	late Sep	5'; all methods work well; blooms 2nd yr, reliable; too weedy for garden or for #1 in field; use #2 or #3 with much grass. SEEDLING TRANSPLANT, SPRING BROADCAST, FALL BROADCAST. With us this has been the weediest of all the plants we call "prairie".
Silphium laciniatum	general	late Jun to early Aug; YELLOW	early Oct	6'; easy by #1 & #2, blooming 3rd or 4th yr; has only one true leaf 1st yr. Adult lvs much prized for arrangements. SEEDLING TRANSPLANT, SPRING BROADCAST. Only one true leaf 1st yr; fls 3rd or 4th yr.
Silphium terebinthinaceum	general	early Jul to early Sep; YELLOW	early Oct	7', easy by #1 & #2, blooming 3rd yr; only 1 true lf 1st yr. Adult lvs used for arrangements. SEEDLING TRANSPLANT, SPRING BROADCAST. Only one true leaf 1st yr; fls 3rd yr.

Sisyrinchium albidum	general	mid May to mid Jun; Jul PALE BLUE			8"; easy by #1, blooming 2nd yr, reliable. Clumps can be divided into 40 or more plts after 1 growing season. SEEDLING TRANSPLANT. Fls 2nd yr. Clumps can be divided in Apr, plts banded like sdgls.
Solidago riddellii	alkaline, wet to dry	early Sep to early Oct; YELLOW	Oct		3'; easy by methods #1 and #3; has attractive lily-like foliage. SEEDLING TRANSPLANT, FALL BROADCAST.
Solidago rigida	general	late Aug to early Oct; YELLOW	Oct		3 1/2'; easy by all methods. Too coarse for the garden; should be sown with much grass for competition. SEEDLING TRANSPLANT, SPRING BROADCAST, FALL BROADCAST.
Sorghastrum nutans	general	late Aug to mid Sep; STAM. YELLOW	Oct		5'; easy by methods #1 & #2, blooming late 1st yr. One of the best grasses for fuel and weed competition. Decorative. SEEDLING TRANSPLANT, SPRING BROADCAST, FALL BROADCAST, NISBET DRILL. Often fls late 1st yr. <u>Warm-season grass.</u>
Spartina pectinata	moist	early Jul to late Aug; STAM. CREAM	late Oct		5'; method #1, though viability is low. Plts grow fast and bloom late 1st yr; soon form colonies by rhizomes. SEEDLING TRANSPLANT. Growth rapid, with fls late 1st yr. Highly rhizomatous; good for erosion control in ditches.
Sporobolus heterolepis	general	Aug; inconsp.	Oct	Sep 21	2 1/2'; method #1, blooming 1st yr if planted early. The most ornamental of all our grasses, suitable for formal gardens. Best by SEEDLING TRANSPLANT, but a few emerge with SPRING BROADCAST and FALL BROADCAST.
Stipa spartea	mesic to dry	mid Jun; inconsp.	Last of Jun; 1st of July		2'; method #1, blooming 2nd yr; but by this method plts short-lived; broadcast in '67 with other grasses. SEEDLING TRANSPLANT, SPRING BROADCAST, FALL BROADCAST. Cool-season grass with remarkable quill-like fruit. Fls 2nd yr.
Valeriana ciliata	moist, alkaline	mid May to early Jun; CREAM	late Jun		20"; sow sds in flats while fresh, transplant to field in a few wks; will bloom next spring; reliable. Plts stink. SEEDLING TRANSPLANT; sow sds while fresh; sdgls emerge in a few days, and are transplanted same season; fls next spring!
Vernonia fasciculata	moist	lat Jul to late Aug; DEEP PURPLE	Oct		3 1/2'; easy by methods #1 & #2; too coarse for garden use; best used sparingly in mixture with tall grasses. SEEDLING TRANSPLANT, SPRING BROADCAST. When collecting sds, be sure not to confuse this with V. missurica, etc.

Veronicastrum virginicum	moist to mesic	early Jul to early Aug; WHITE	Oct	3 1/2'; seed tiny, but easy by method #1; reliable in field, but not healthy in nursery. Attractive. SEEDLING TRANSPLANT. Sds tiny, but plts grow well, with fls 2nd yr.
Viola pedatifida	mesic to dry	mid May; PURPLE-BLUE	Jun +	6"; sds should be planted while fresh; cleistogamous fls produce sd after regular bloom. Short-lived in cult. SEEDLING TRANSPLANT. There is sd production by cleistogamous fls after the conspicuous fls cease.
Zizia aptera	mesic to dry	late May to Mid Jun: YELLOW	Aug	1 1/2'; stratify longer than most; blooms 2nd yr and reliably thereafter. SEEDLING TRANSPLANT. Stratify sd longer than most. Fls 2nd yr.
Zizia aurea	moist to mesic	mid May to mid Jun: YELLOW	Aug	20"; stratify long; blooms 2nd yr and thereafter. SEEDLING TRANSPLANT. Needs long stratification. Fls 2nd yr.

Conclusions

These notes were compiled by Ray Schulenberg for a class in prairie plant propagation at the Morton Arboretum in autumn of 1967. The list does not include all the prairie plants of the Chicago region, but only those on which sufficient propagation is available, based on successful field work at the Arboretum. Several more species are in their first year; others have been tried unsuccessfully, and others are yet to be attempted.

The first version of these notes was compiled in fall of 1967 for a Morton Arboretum class in prairie plant propagation. It is now revised for distribution in response to continuing requests from people who would like to restore prairie or just to raise a few prairie plants. The plant list included here is not complete; we have a complete list of plants in our prairie restoration plots, available on request, giving common names, families, and evaluation--but without propagation notes.

The above information was given to me in 1981 by Doug and Dot Wade from Windrift Prairie Nursery. The information included 3 versions of a prairie plant propagation handout by Ray Schluenberg. I have attempted to condense the information changes in the various versions into one comprehensive handout. I have tried to maintain Schulenberg's format, but a skilled typist can do some things MS Word can not. Any errors or discrepancies are my fault.

Although 30 years old, this information is still accurate and very relevant to restoration in 2011. Most commercial restoration has forgotten its roots, its realities and its limitations. Dennis Lubbs Genesis Nursery, inc.