SEEDS OF DIVERSITY

Iowa Department of Natural Resources Prairie Seed Harvest Team **June 2005**

Prairie Seed Harvest Team; Past, Present, and Future

In 1997 a seed harvest experiment was begun when IDNR leased a combine and USFWS provided a rice head stripper for initial harvest of native plants. From this first harvest came the idea to dedicate full time employees to harvest native plants year round.

In the fall of 2000 the Wildlife Bureau of the IDNR initiated the Prairie Seed Harvest Team. After a year of familiarization with the Prairie Seed Harvest Program, the Team (Bill Johnson, Eliot LaFollette, and Laurence Andrew) consulted with other organizations for input regarding management and program direction. These groups included Iowa educational organizations, private non-profit conservation organizations, US; State and county government organizations, Iowa Prairie Network, and Pheasants Forever. By uniting these diverse groups with varied prairie interests, the IDNR Prairie Seed Harvest Team could better formulate a strategy for improvement of Iowa's prairie resources.

The need for diverse prairie seed is easily identified within the IDNR. Every year the IDNR's Wildlife Bureau purchases land for public use. The amount of land varies from 5000-7000 acres per year in the height of the Prairie Pothole Joint Venture (PPJV) purchases to 2000-3000 acres per year in more recent years. These new acquisitions as well as thousands of acres already managed by IDNR will need restoration and diversification. Due to time and budget restraints, this has not always been possible. By producing diverse prairie seed the Prairie Seed Harvest Team is helping make this goal for land management more economically feasible.

Butterfly milkweed, *Asclepias tuberosa*,
Adel Production Plots - July 2004

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Early successional species in a planted prairie

Goals of the Prairie Seed Harvest Team

1. To produce diverse Iowa-origin grass and forb seed for prairie reconstruction on IDNR land that will assure abundant, high-quality ecology cal prairie reconstruction throughout Iowa on which diverse fauna is dependent. Iowa is divided into three eco-zones, north to south, across the state, each zone consisting of 3 tiers of counties. Our Vision Statement goal was to produce a minimum of 6 native grass and 60 native forb species per zone. As the table (current species in production) on the next page shows, we are approaching this goal. (Please note that not all species are at seed production stage.) A future goal is to track all seed emanating from the Prairie Seed Harvest Team.
2. To research and develop new techniques for planting, propagating, and harvesting prairie species.
3. To develop awareness, understanding and appreciation of Iowa's natural resources among stakeholders, customers and the public by continued education and communication. We want to connect Iowans to prairie resources of the state.
4. To work with various prairie stakeholders to develop goals, policies and programs through more cooperation, leadership and advocacy.

Future Goals:

What does the future hold for the Prairie Seed Harvest Team?

We are continuing to establish additional fields of short grasses, Little bluestem and Side oats grama, to meet DNR demand for short grasses and to more accurately reflect the structure of native prairie in our plantings. We have an additional 18 acres of short grasses that were planted in 2003 that should be ready for harvest in fall, 2005. In addition, we planted 40 acres of Little bluestem and Side oats grama this spring, and we are striving to improve availability of cool-season native grasses.

THE FIRST FOUR YEARS OF THE PRAIRIE SEED HARVEST TEAM

YEAR	FORB SPECIES ALL-IOWA ORIGIN	AMOUNT PLS LBS
2001	**5** All South	**31.2** Lbs
2002	**22**	**396** Lbs
2003	**52** North **40** Central **52** South **43**	**935** Lbs North **289** Central **424** South **221**
2004	**79** North **49** Central **62** South **49**	**1032** Lbs North **335+** Central **407** South **290**

Forb production is the other area where we have not yet met DNR demand. We are continuing to enlarge forb production plots at North Central Correctional Facility (NCCF) and Adel as well as adding a new plot at Fort Dodge Correctional Facility. Experimental fields of 3 forb species are being established this year. And we will continue to add forb and grass species to our production list, eventually including some of Iowa's more conservative prairie species.

We are expanding our role in prairie education, are currently working on a seedling identification guide, and leading tours of our grass fields/forb production plots. Power point presentations are given to interested groups and a traveling display for environmental/nature related events has been made available. With our new facility we will eventually be offering workshops on grass/forb propagation techniques.

Native remnant prairies may have 10 to 300 plant species with forbs blooming as early as April and as late as October. Here are species currently grown although all are not yet producing seed. There are a few additions depending on greenhouse seedling and transplant-to-plot successes.

Common Name	Genus species	Zone	Common Name	Genus species	Zone
Alum root	Heuchera richardsonii	N C S	Partridge pea	Chamaecrista fasciculata	N C S
American germander	Teucrium canadense	C S	Prairie blazing star	Liatris pycnostachya	N C S
Azure aster	Aster azureus	N C	Prairie coreopsis	Coreopsis palmata	N C S
Big bluestem	**Andropogon gerardii**	N C S	**Prairie dropseed**	**Sporobolus heterolepsis**	N C S
Black-eyed Susan	Rudbeckia hirta	N C S	Prairie larkspur	Delphinium virescens	N C
Blue vervain	Verbena hastata	N C S	Prairie onion	Allium stellatum	N
Boneset	Eupatorium perfoliatum	N	Prairie phlox	Phlox pilosa	N C S
Butterfly weed	Asclepias tuberosa	N C S	Prairie ragwort	Senecio pauperculus	N C
Cardinal flower	Lobelia cardinalis	C S	Prairie spiderwort	Trandescantia bracteata	C
Cinquefoil	Potentilla arguta	N C S	Prairie sunflower	Helianthus rigidus	N C
Common mountain mint	Pycnanthemum virginianum	N C S	Prairie violet	Viola pedatifida	C S
Compass plant	Silphium laciniatum	N C S	Purple meadow-rue	Thalictrum dasycarpum	N C
Cord grass	**Spartina pectinata**	N C S	Purple prairie clover	Dalea purpurea	N C S
Cream wild indigo	Baptisia bracteata	C S	Quinine	Parthenium integrifolium	N
Culvers root	Veronicastrum virginicum	N C S	Rattlesnake master	Eryngium yuccifolium	N C S
Cup plant	Silphium perfoliatum	C S	Redroot	Ceanothus herbaceus	C S
Dotted blazing star	Liatris punctata	C S	Rose	Rosa sp.**	S
Evening primrose	Oenothera biennis	N	Rosinweed	Silphium laciniatum	N C S
Everlasting	Gnaphalium obtusifolium	C	Rough Blazing star	Liatris aspera	N C S
False boneset	Brickellia eupatorioides	C	Round-headed bush clover	Lespedeza capitata	N C S
Flowering spurge	Euphorbia corollata	C S	Sage	Artemisia ludoviciana	N C
Giant St.Johns wort	Hypericum pyramidatum	C S	Scaly blazing star	Liatris squarrosa	C
Glacous white lettuce	Prenanthes racemosa	C	Sedge	Carex sp.**	C
Golden alexanders	Zizia aurea	N C	Self heal	Prunella vulgaris	S
Grass-leaved goldenrod	Euthamia graminifolia	N	Showy goldenrod	Solidago speciosa	N
Gray-headed coneflower	Ratibida pinnata	N C S	Showy tick trefoil	Desmodium canadense	N S
Great blue lobelia	Lobelia siphilitica	N C S	**Side oats grama**	**Bouteloua curtipendula**	N C S
Ground plum	Astragalus crassicarpus	C	Smooth blue aster	Aster laevis	N C
Heath aster	Aster ericoides	C	Sneezeweed	Helenium autumnale	N C
Hoary vervain	Verbena stricta	C	Spiked lobelia	Lobelia spicata	N C S
Hyssop	Gratiola neglecta	S	Stiff goldenrod	Solidago rigida	N C S
Indiangrass	**Sorghastrum nutans**	N C S	Sullivants milkweed	Asclepias sullivantii	N
Ironweed	Vernonia fasciculata	N C S	Swamp milkweed	Asclepias incarnata	N C
June grass	**Koeleria macrantha**	N C S	**Switchgrass**	**Panicum virgatum**	N
Lead plant	Amorpha canescens	N C S	Tall boneset	Eupatorium altissimum	S
Little bluestem	**Schizachyrium scoparium**	C S	Tall coreopsis	Coreopsis tripteris	C S
Milk vetch	Astragalus canadensis	N C S	Thimbleweed	Anemone cylindrica	N C S
New England aster	Aster novae-angliae	N C S	White prairie clover	Dalea candida	N C S
New Jersey tea	Ceanothus americanus	N	White wild indigo	Baptisia lactea	N C S
Ohio spiderwort	Trandescantia ohiensis	C S	Wild bergamot	Monarda fistulosa	N C S
Ox-eye	Heliopsis helianthoides	N C S	Wild licorice	Glycyrrhiza lepidota	N
Pale gentian	Gentiana alba	C	Wild petunia	Ruellia humilis	S
Pale purple coneflower	Echinacea pallida	N C S	Wild senna	Cassia marilandica	C

A study of the milkweed fauna of Wisconsin

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Over the years 1992 - 2002, I collected a wide array of prairie insects in Wisconsin, including specimens from the 15 local species of *Asclepias*, *Apocynum* and *Vincetoxicum* -- the milkweeds of Wisconsin. Now, I focus on these milkweeds and their specialist fauna, that is to say, those species that would disappear if the milkweeds disappeared. Which milkweed species does a given specialist use, where does it live in the state, what is its life history, what are its predators, parasites and parasitoids? So far, I have found 23 specialists, but might find about 30.

Sullivants Milkweed, Asclepias sulivantii
Doolittle Prairie

Six of these specialists are beetles: four long-horned beetles, two leaf beetles and two weevils. Many species in these three beetle families are known for their food plant specificity. *Labidomera clivicollis*, a leaf beetle, sometimes supports a parasitic mite known only from this beetle. These two weevils support a parasitoid in Braconidae, a wasp known only from these weevils. Five of these specialists are in the order Hemiptera: three aphids and two seed bugs. Six are moths and one a butterfly -- the monarch. There are several flies specific to milkweeds, but I have found only one as yet. Many other species use milkweeds and I study them in a less vigorous way, though I ignore the vast array of insects visiting the flowers for nectar. The interesting study of milkweed pollination biology I leave to others.

Most of these 23 milkweed specialists are herbivores. Many of them support predators, but I have not found any predator that specializes on any of these prey animals. Most of these 23 support parasitoids, and some of these may prove to be specific to their hosts, like the wasp mentioned above. Parasitoids develop in or on the bodies of other insects, consuming their host over the course of their own larval development. Very many insect species have this life history, which is often unknown to botanists and vertebrate zoologists. Even more fantastic, some of the parasitoids I have reared out of these herbivores themselves produced parasitoids. These we call hyper-parasitoids.

This set of milkweed specialists and their ramifying ecological relationships are in no way exceptional. One can assume that every native plant species or genus has its own suite of specialist insects, until one discovers the exception to that rule through study. Yet the people who manage our vanishing prairies generally are unaware of this complexity. Unless one has studied entomology, how would one learn about this?

"There used to be rivers of butterflies, but now there are years when there are no butterflies at all. This is a village full of ghosts, not of people, but of nature, a paradise lost." -- Homero Aridjis, a naturalist in Contepec, Mexico.

Though our awareness of a specialist fauna on milkweeds goes back more than two centuries, and the literature includes many references to these animals, there is still much we do not know about them. I anticipate continuing my study of Wisconsin's milkweed fauna for at least another five field seasons and even more "library seasons", as I now refer to winter. Perhaps by then I will know something about how a cool season burn might affect all these animals, each with its own life history, or how intermittent light grazing, or any other prairie management technique, might affect them. Still, on any prairie, there are dozens of other native plants, each supporting its suite of specialist insects. What I learn about milkweeds' fauna might lead me to behave in a manner that compromises other specialist animals. How could it be otherwise? My information is incomplete, imperfect. So it's wise to manage our precious prairies and other wild lands by taking our ignorance into account. We should use a variety of management tools and techniques spread over time and space to lessen the risk of harm inherent in everything we do. After all, these specialist insects that comprise the majority of all prairie-restricted species (many more than the plants that support them), particularly the specialist parasites and parasitoids, are the primary reason we protect these wild lands. This is the heart of biodiversity and so should be central to our conservation efforts.

This great need of information and the joy of pursuing it led some of us to create an all-volunteer nonprofit, Prairie Biotic Research, Inc., in 2000. We foster curiosity by supporting basic biotic research in native and restored grasslands through our annual Small Grants Program, through which we have expended $20,554 in 22 grants over the last four years. We need your support. We must show IRS that some segment of the public supports our mission; the size of a donation is not important. Please send your name and postal address to me at awilliam@facstaff.wisc.edu for more information.

Order	**Family**	**Species**
Acari	Podapolipidae	*Chrysomelobia labidomerae*
Coleoptera	Cerambycidae	*Tetraopes annulatus*
		Tetraopes femoratus
		Tetraopes quinquemaculatus
		Tetraopes tetrophthalmus
	Chrysomelidae	*Chrysochus auratus*
		Labidomera clivicollis
	Curculionidae	*Rhyssomatus annectans*
		Rhyssomatus lineaticollis
Diptera	Agromyzidae	*Liriomyza asclepiadis*
Hemiptera	Aphididae	*Aphis asclepiadis*
		Aphis nerii
		Myzocallis asclepiadis
	Lygaeidae	*Lygaeus kalmii*
		Oncopeltus fasciatus
Hymenoptera	Braconidae	*Bracon rhyssemati*
Lepidoptera	Arctiidae	*Cycnia inopinatus*
		Cycnia oregonensis
		Cycnia tenera
		Euchaetes egle
	Noctuidae	*Spargaloma sexpunctata*
	Nymphalidae	*Danaus plexippus*
	Pyralidae	*Saucrobotys futilalis*

Milkweed Tussock Moth larvae
Euchaetes egle

Oncopeltus fasciatus, Milkweed Bugs - Phylum, Arthropoda; Class, Insecta; Order, Hemiptera

As nymphs or immatures, milkweed bugs can be found in groups on the milkweed plants. These nymphs look similar to the adults except they do not have full wings and their color pattern is slightly different. From the egg they molt 5 times to reach adulthood. Adults have full wings that cover their abdomen.

Like the monarch caterpillar these bugs have the ability to tolerate the toxic compounds in milkweed plants. Because they concentrate the sap (which contains toxins) of the milkweed plants in their bodies they have few predators. It is suggested that their bright color advertises their bad taste. They can be important in regulating populations of milkweed which should make them popular with farmers.

They have a long proboscis which is used to pierce the seed and inject salivary enzymes. They eat the seeds and tissue of milkweeds.

In one article concerning these bugs it listed their negatives as “NONE, unless you are trying to raise milkweed plants ” which, of course, we are!

A right handsome mature milkweed bug on butterfly milkweed, Adel production plots, July 2004

Milkweed bug nymphs on swamp milkweed, Brushy Creek plots

Please welcome Jessica Bockenstedt, our newest temporary member, to the Prairie Seed Harvest Team. She is a spring 2005 graduate from Iowa State with a BS in Animal Ecology who also works part time studying house wrens at Hinds farm near Ames. Previously she has helped with research on the affects of wind turbines on bats/birds near Joice, Iowa and research on nesting success of grassland birds in filter strips near Windom, MN.

Originally from Center Point, Iowa she has a farm background. Her Arabian horse is named Holly and her 3 dogs are Bailey, Semour, and Susie (named after the prairie flower black-eyed Susan)