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Survey Of Medicinal Herbs Of Central Illinois Prairie And Woodlands

Debra Ann Welch
Eastern Illinois University

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Survey of Medicinal Herbs of Central Illinois

Prairie and Woodlands

(TITLE)

BY

Debra Ann Welch

THESIS

SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS
FOR THE DEGREE OF

Master of Science in the Natural Sciences

IN THE GRADUATE SCHOOL, EASTERN ILLINOIS UNIVERSITY
CHARLESTON, ILLINOIS

2013

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Survey of Medicinal Herbs of Central Illinois Prairie and Woodlands

By

Debra Ann Welch, B.S.

Agriculture & Secondary Science, University of Missouri-Columbia

THESIS

IN THE GRADUATE SCHOOL, EASTERN ILLINOIS UNIVERSITY

CHARLESTON, ILLINOIS

A Thesis Presented to the Faculty of the Graduate School of Eastern Illinois University in Partial Fulfillment of the Requirements for the Degree of Master of Science of Natural Sciences (Research)

2013

Abstract

Illinois has been named the "Prairie State" for good reason. When the pioneers discovered a vast sea of grasses and forbs, they thought the prairie infertile. However, they soon found out that the blacksoil prairie was composed of a rich diversity of plant species that could provide much of the medical and nutritional needs of everyday life. The medicinal uses of many prairie species have not only been tested throughout history, but today modern science has also discovered their therapeutic importance.

The purpose of this study was to survey prairie species growing in the central Illinois counties of Coles and Clark, and compare flowering or fruiting species collected with those of James Hefley's 6-county study (Hefley, 1987). The collected species were stored in the Stover-Ebinger Herbarium on the Eastern Illinois University campus. An analysis was performed of the medicinal properties of these herbs, by researching their functional uses based on the presence of chemical constituents within the tissues of the species in this study. In addition, the species collected were analyzed for their Coefficient of Conservatism and Floristic Quality as an indication of the resulting Natural Quality of the areas in all three studies.

It was determined that species found in the 7 counties researched revealed a Mean Conservatism of native species collected in the C to D grade range. The highest value of 4.393 was from Hefley's study. Woodyard and Coleman Farms coefficient of conservatism was 3.423 and 3.226 respectively. Floristic Quality for the natives in both Woodyard Conservation Area and Coleman Farm was ranked as degraded with restoration potential. Of all species researched in this study, 70% showed medicinal properties.

This study presents the richness of resources within the central Illinois prairie and the importance of preserving tall-grass prairie remnants. With a very small part of the tall-grass prairie remaining in Illinois, it is crucial that conservation efforts be utilized in an effort to save the last remaining ecosystem: the "Grand Prairie of Illinois."

Dedication:

I would like to dedicate this thesis to my father and mother, whose undying love and devotion helped me to finish this project. I sincerely thank them for their encouragement and support throughout my educational career in life. Thanks also goes to my husband and daughter, whose patience and understanding helped me during the many hours necessary to complete this project.

Acknowledgements:

I wish to thank my chairperson, Dr. Gordon Tucker, for his help and support throughout this project, and his expertise in ethnobotany. I sincerely appreciate Dr. Tucker's patience in helping me and answering many questions from beginning to end of this thesis. Without his help it would have been difficult for me to finish when I did. I also thank him for his part in encouraging in me an interest in the world of plants, herbs of the prairie, in particular. I also wish to thank my committee members, Dr. Andrew Methven and Dr. Diane Burns, for their guidance. Dr. Methven has provided encouragement and helped in each important step through the years and provided valuable information in order for me to complete my degree. I have enjoyed the classes taught by all my instructors, however, Dr. Burns has been a great inspiration in stimulating thought-provoking lessons in her classes that I have the pleasure of taking in this program. She indeed made classes fun as well as educational.

In addition, I want to thank Eastern Illinois University's Graduate School for making this wonderful program available to teachers during the summer months.

I want to extend my sincere appreciation to the many colleagues and friends I have met through the program.

Finally, I thank my husband, Clyde, daughter Andrea, and my parents John and Doris Welch, for their understanding and encouragement.

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Introduction

For millennia, humans have relied on a medicine chest of plants growing in the wild. Within each herb is a mix of chemicals that give rise to the term "natural products." The natural products found in specific plants gives each species its own characteristic taste or smell. Almost half of all prescription drugs sold in the U.S. includes a plant-derived substance. Many plants have made their mark politically due to the economic importance of herbal remedies. Throughout human history many merchants or even rulers have become wealthy based on trading of plants for various uses (Firn, 2010). No doubt, herbs have played an important role in the history of mankind, including the Native American Indians and pioneers of central Illinois. Both shared remedies and uses for common herbs that grew in their specific regions. Some herbal cures have been considered folklore, for example, in the case of the "Doctrine of Signatures" (Sumner, 2000). However, modern science has revealed that many treatments using herbs are therapeutic in nature. Today, there is an increased interest in the use of herbal remedies and treatments in the United States and other countries by people seeking natural cures or treatments (Robbers and Tyler, 1999).

2,000 years ago they KNEW that garlic worked when consumed as part of their regular diet.

Native plants provided a medicine chest of the only treatments needed by the early American pioneers. The women of the Illini Indian tribes were hired to work in American households because of their vast knowledge of herbal remedies and treatments (Hefley, 1987). Over time these herbal medicines were passed down to future generations because of their effectiveness in treating certain ailments.

Modern day medicine has eliminated the natural herbal choices that was once relied upon by every American household. Many are of the opinion that herbal treatments are merely folk remedies that are no longer useful and the stuff of "ancient superstitions." However, over the centuries it has been known that herbs provided a therapeutic value for various physical afflictions that plagued man. Since going to a physician often resulted in a deadly outcome for the patient. Most people chose to self-medicate by growing and collecting their own medicinal herbs. Some cures were pure folklore as was the "Doctrine of Signatures". This doctrine was based upon using plant parts that resembled human body parts as a remedy for that particular organ that was affected or diseased (Sumner, 2000). However, today it is well known that the plant kingdom is rich with naturally occurring compounds of therapeutic value. Because of different uses of herbs, they can be defined in several

ways. To the botanist, herbs are non-woody, seed-producing plants that die at the end of each growing season. From a medical perspective, herbal remedies are defined as *crude drugs of vegetable origin utilized for the treatment of disease states, often of a chronic nature, or to maintain a condition of improved health* (Robbers and Tyler, 1999). Herbal medicines made by extraction of plants using solvents to create tinctures and fluidextracts are known as phytomedicinals or plant medicines.

Phytochemistry of Herbs

Although, the active components of plant-based medicines are many, this paper will briefly review the following groups: lipids, phenols, tannins, proteins, alkaloids, carbohydrates, glycosides, essential oils, and mucilages that may contribute medicinal value within the 25 wildflower species discussed in this project.

Lipids refer to fixed oils, fats and waxes consisting of long-chain fatty acids and alcohols. In plants, lipids function as reserve food materials and are found in seeds, spores, and bulbs. The use of lipids is important in treating dermatological conditions.

Polyphenols are known as 'phenolic compounds' in which one or more hydroxyl groups are attached to a carbon atom in an aromatic molecule. Phenols are powerful reducing agents commonly found in caffeic, ferulic and coumaric acids (PDR, 1998).

Flavonoids consist of a basic 15 carbon chain with two rings. Flavonoids are best known as antioxidants and provide many functions in plants, one of the most

important being the pigments of flowers. Pigments such as yellow, red, and blue are valuable in attracting pollinators. Medically, this group shows much promise in preventing cancer and cardiovascular diseases, especially by the intake of superfoods such as fruits, vegetables, tea and red wine. Another class of flavonoids are anthocyanins. These chemicals are naturally found in berries such as black currants and are responsible for the dark pigments of these fruits. Research indicates that anthocyanins are instrumental in inhibiting certain enzymes that cause inflammation in conditions such as arthritis (News-Medical, 2013).

Tannins are polymerized flavonoids found in bark, wood, fruits, leaves, flowers, and roots. The skin of unripe fruits contain high levels of tannins. The bitter aftertaste of tea,for example, is responsible for the presence of tannins. Tannins are widely known for having astringent and antiseptic properties (Tucker, 2013). Tannins have the ability to form a thin layer when in contact with proteins which provides a mild antiseptic coating over wounds. Recently, research has discovered certain anti-viral and anti-cancer properties of tannins (PDR, 1998).

Proteins are nitrogenous organic substances that are formed from amino acids. Among the proteins that have been isolated which have therapeutic value, are oil-bearing plant seeds, antitoxins, serums, and globulins. In addition, the amino acids that form proteins, are precursors to many other medicinally important molecules. Examples of these amino acid derivatives are: peptides, enzymes, amines, the *Allium* compounds, and glucosinolates (Ganora, 2013).

Alkaloids are nitrogenous compounds of plant origin, and act as analgesics, local anesthetics, tranquilizers, antispasmodics, and hallucinatory drugs. Examples include: caffeine, codeine, morphine, cocaine, cocoa, coffee, tea, ephedra and theobromine (PDR, 1998). An alkaloid, known as Reserpine, was one of the first high blood pressure medications used in cardiovascular medicine. Reserpine originates from *Rauwolfia serpentina,* a medicinal herb with a long history of use in Ayurvedic medicine (Tucker, 2013).

Carbohydrates are an important class of organic compounds composed of carbon, hydrogen and oxygen as either aldehydic or ketonic alcohols. It is known that each plant is composed of various types of carbohydrates which are classed into 5 groups: monosaccharides, disaccharides, oligosaccharides, polysaccharides, and organic acids. Carbohydrates have therapeutic value as antibiotics, form emollients for treatment of skin disorders, and stimulates non-specific immunity (Ganora, 2008). Important phytochemicals that fall under this group are inulins, gums, pectins, mucilages, immunomodulating polysaccharides (*Echinaceae*) and organic acids (salicyclic acid).

Glycosides are more abundant than alkaloids and contain nitrogen compounds and a sugar component, glycine, and a non-sugar molecule, aglycone or genin. Functions in plants are sugar reserves, as well as detoxifying and defensive mechanisms. Medically, glycosides possess certain pharmacological properties, for example, digitoxin acts as a cardiac stimulant and salicin is an analgesic (PDR, 1998).

Volatile oils are odorous constituents. Volatile oils are named because in the presence of high temperature the oils evaporate. Another characteristic they possess

is an odor or essence when leaves of certain herbs are crushed. Many families possess these odors; for example, Apiaceae, Asteraceae, and Lamiaceae have oils in their glandular hairs. The Lamiaceae family, (mints) have been known for centuries as a treatment to alleviate stomach-ache due to their essential oils (PDR,1998).

Mucilage is the gelatinous substance formed from large polysaccharides that form a viscous fiber in water. Primarily, mucilages function within the cells of herbs in water retention, food storage, and acting as a membrane thickener and stabilizer (PDR, 1998). Mucilages found in many herbs also provide a role in strengthening the body's immune system. Some herbs high in mucilage are flax, psyllium seed, mallow leaf, aloe vera, licorice root, and mullein leaf (Robbers and Tyler, 1999).

Illinois-The Prairie State

Before the migration of the Europeans to America, Illinois consisted of 22 million acres of prairie habitat. At this time, central Illinois was covered by 90% or more prairie and savanna vegetation (Robertson, 1996). The term prairie was derived from the French word meaning "meadow" (Robertson, 1996). This vast sea of grasses was the direct result of the advancement of glaciers into Illinois thousands of years ago. The glacial movements allowed for drift materials to be deposited, which left most of the state flat and poorly drained (Baumann, 2008). After the last retreating glacier, over half the state was flat prairie (Harbison, 2013). Wetlands across the state persisted and allowed for the decomposition of heavy prairie vegetation; thus creating a very fertile soil rich in organic matter. Illinois is surrounded by a diverse system of ecological regions; for example, glacial lakes in the north, cypress swamps

in the south and prairies stretching for many hundreds of miles in between. Due to this vastness of tall-grass prairies, Illinois has been nicknamed the "Prairie State." One can easily see why Illinois has been given such a reference, because the state has one of the largest populations of prairie species in the U.S. (Kurz, 2004).

Several pioneer cemeteries in northern and central regions of the state have been established on virgin mesic-blacksoil prairie. The blacksoil prairie dominates the central region of Illinois, and due to the rich prairie growth, was referred to as the "Grand Prairie" of Illinois. The different species of prairie wildflowers is due to the moisture levels and types of soil. Therefore, the term "mesic" refers to the moderate amount of moisture in this region (Hilty, 2012). Due to the glacial movement during the last ice age, the resulting blacksoil of the Grand Prairie has been considered the most agriculturally productive in the world. Researchers have studied these areas because they exist on original mesic-blacksoil prairie and therefore have a great diversity of plant species in Central Illinois (Robertson, 1996).

For this reason, most of the prairie has been plowed up and many prairie species lost. Unfortunately, very few acres of unplowed, original prairie remains in Illinois. Scientists have looked at these areas in Ford, Iroquois, and McLean counties for examples of original prairie vegetation that still survives today. All three remnants exist on 5 acres of virgin prairie that were established as pioneer cemeteries. These areas have also been dedicated as Illinois Nature Preserves (Robertson, 1996) and one of the few remaining regions in Illinois that are from the original prairie.

Purpose of Study

The primary focus of this study is to catalog the existence of species that still survive today in central Illinois prairie and woodlands. The study areas included two locations: Woodyard Conservation Area in Coles County (39.462309^0, -88.155577^0, elevation 207 m/680 feet) and Coleman Farm situated in Clark Center of Clark County (39.316326°, -87.909400°, elevation 179 m/600 feet). Specimens of flowering or fruiting species were collected, identified and stored in the Stover-Ebinger Herbarium on the Eastern Illinois University campus. Species collected were reviewed for their therapeutic value and/or current or past uses in medicine. This information can be used in public education to give students a new perspective on how medicines are developed from nature as well as teaching students about ecological responsibility.

METHODOLOGY

Overview of Design

This study had two main goals: 1) Inventory plant species growing in two study areas: Woodyard Conservation Area and the Coleman Farm. Woodyard Conservation Area is located in Coles County, about 2 miles South of Charleston on Route 130 (39.462309°, -88.155577°, elevation 207 m/680 feet). The Coleman Farm is in Clark County, situated 3 miles west of Martinsville on Cumberland Road (39.316326°, -87.909400°, elevation 179 m/600 feet). Both areas, (Figure 1), represented locations in which comparisons were made of species that possess medicinal or therapeutic value. A previous study was done by James Hefley in 1987, in which Mr Hefley collected and cataloged 58 species of medicinal herbs. Hefley included the following counties in his research: Montgomery, Christian, Fayette, Shelby, Moultrie, and Coles (Hefley, 1987). Comparisons on medicinal species were made in this study with the data collected from Hefley's research. 2) To make students aware of the importance of medicinal plants that grow in natural areas of central Illinois. Specifically, the author wishes to target the therapeutic uses of forbs found in the Grand Prairie and woodlands of central Illinois for use in the public school classroom as part of the science curriculum.

Sampling Procedure

Both study areas were visited from April 2011 through June of 2013 and most specimens were collected in 2011 and 2012. During these two years, collecting took place during spring, summer and fall with most specimens obtained from June through August.

All flowering or fruiting specimens encountered were collected and pressed while in the field. Most plants collected were forbs, however, wetland species and some grasses were also obtained within the two study areas. Samples were taken from meadows or prairie areas and woodlands, as well as wetland and ravines in both counties. All field samples were dried for a minimum of a 3-day period and then glued on herbarium paper, according to standard preservation methods for vegetative sampling (Mohlenbroch, 2002). Specimens were numbered, identified and deposited in the Stover-Ebinger Herbarium at Eastern Illinois University. Duplicate samples were obtained and sent to the Illinois Natural History Survey Herbarium, Champaign, Illinois (ILLS). Nomenclature followed those developed by Mohlenbroch (2002). After identification and cataloguing, all specimens were documented for their medicinal properties and uses. All specimens were organized according to their Coefficient of Conservatism. The Coefficient of Conservatism is described as the tendency of taxon to be restricted to natural areas and used in calculating the Floristic Quality Index. In addition, comparisons were made with Hefley's research against those of the Woodyard and Coleman study areas.

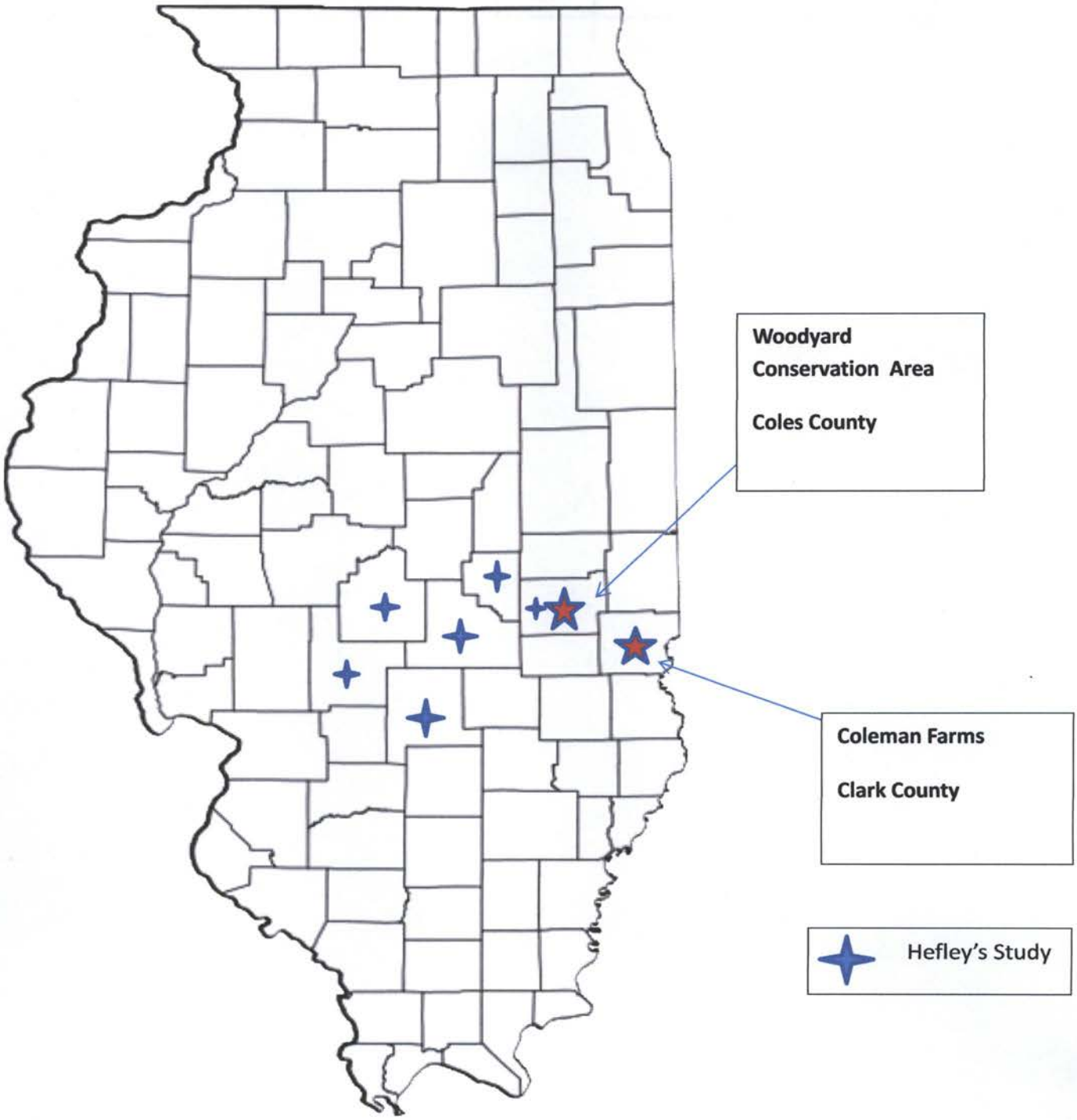

Figure 1. Illinois map showing the counties in which prairie plant specimen research has been done. Red stars indicate current study; blue stars indicate Hefley's research areas.

IV. RESULTS OF THE STUDY- Analysis of Data

Species Richness for 3 prairie remnant areas in central Illinois were analyzed and comparisons made for this study. Hefley's study (Table 1) includes 58 species observed in relation to this study using Woodyard and Coleman Farm.

Table 1. Species Richness results for Hefley Study.

Total Species	58
Native Species	29
Non-Native	29
Genera	55
Families	32

Values were combined for both study areas, Woodyard and Coleman Farm. The following results were documented for species richness (Table 2.)

Table 2. Species Richness for Woodyard and Coleman Study Areas.

Total Species	173
Native Species	114
Non-Native	59
Genera	138
Families	64

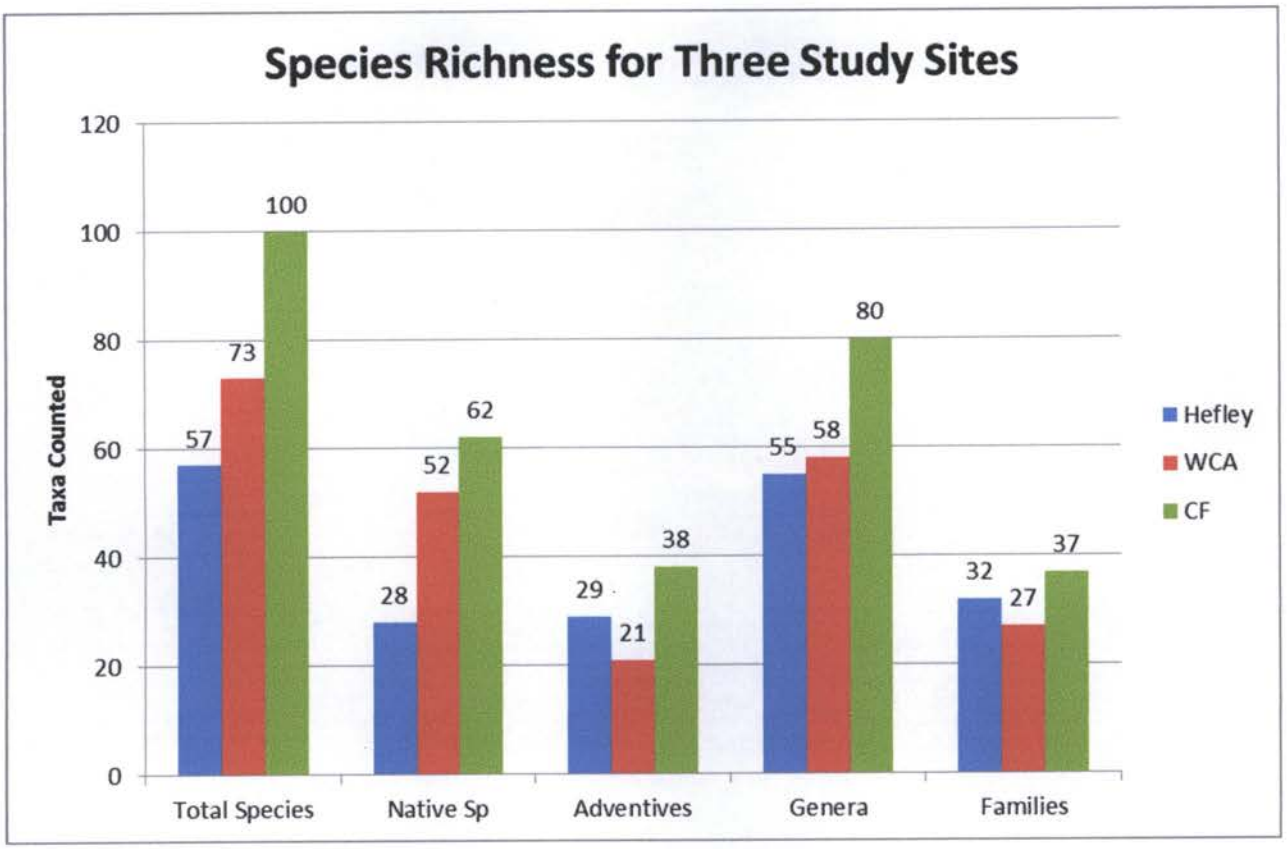

Figure 2. Species Richness: Comparison of Hefley's study sites with Woodyard and Coleman Farm of prairie remnants in Central Illinois. (Hefley, 1987).

Table 3. Grading of Natural Quality and Coefficient of Conservatism Ranks.

Grade/CC		Feature:
A*	10	Structure & composition does not show disturbance by humans
B*	9	Slightly disturbed by humans, no major disruption of original structure
C	4-8	Moderately to heavily disturbed, much of original structure changed
D	2-3	Heavily disturbed and original structure severely changed
E	0-1	Original community completely destroyed

**Grades A and B indicate areas of high quality, which translates into the Coefficient of Conservatism values from 9-10. (Robertson, 2000).*

Subjective grading of natural quality is used to determine values for Coefficient of Conservatism. It is important to assess areas that have little human disturbance if efforts toward conservation are going to be successful. Table 3 indicates the quality of natural areas rating system and translates the descriptions into Coefficients of Conservatism that was used in this study.

Table 4. Floristic Quality Summary of 3 Study Sites.

DESCRIPTION	WCA	CF	HEFLEY
INAI Community Classification	Mesic Prairie/ Woodland	Mesic Prairie/ Woodland	Mesic Prairie/ Woodland
INAI Grade	C	C	B/C
Total Sp Richness	73	100	57
Native Sp Richness	52	62	28
% Adventive	29%	38%	51%
FQI	20.8	20.0	16.31
FQI (Natives)	24.7	25.40	23.25
Mean Conservatism	2.438	2.00	2.16
Mean Conservatism Natives	3.423	3.226	4.393

Legend:

<20 Definitely degraded
20-25 Possibly degraded; restoration potential
25-30 Quality Natural Area
>35 Special Natural Area

Table 4. Summarizes the Floristic Integrity data taken of all three study sites. For natives, Floristic Quality was degraded with some restoration possible. Mean Conservatism for natives indicated plants growing in a somewhat degraded environment and tolerant of disturbance.

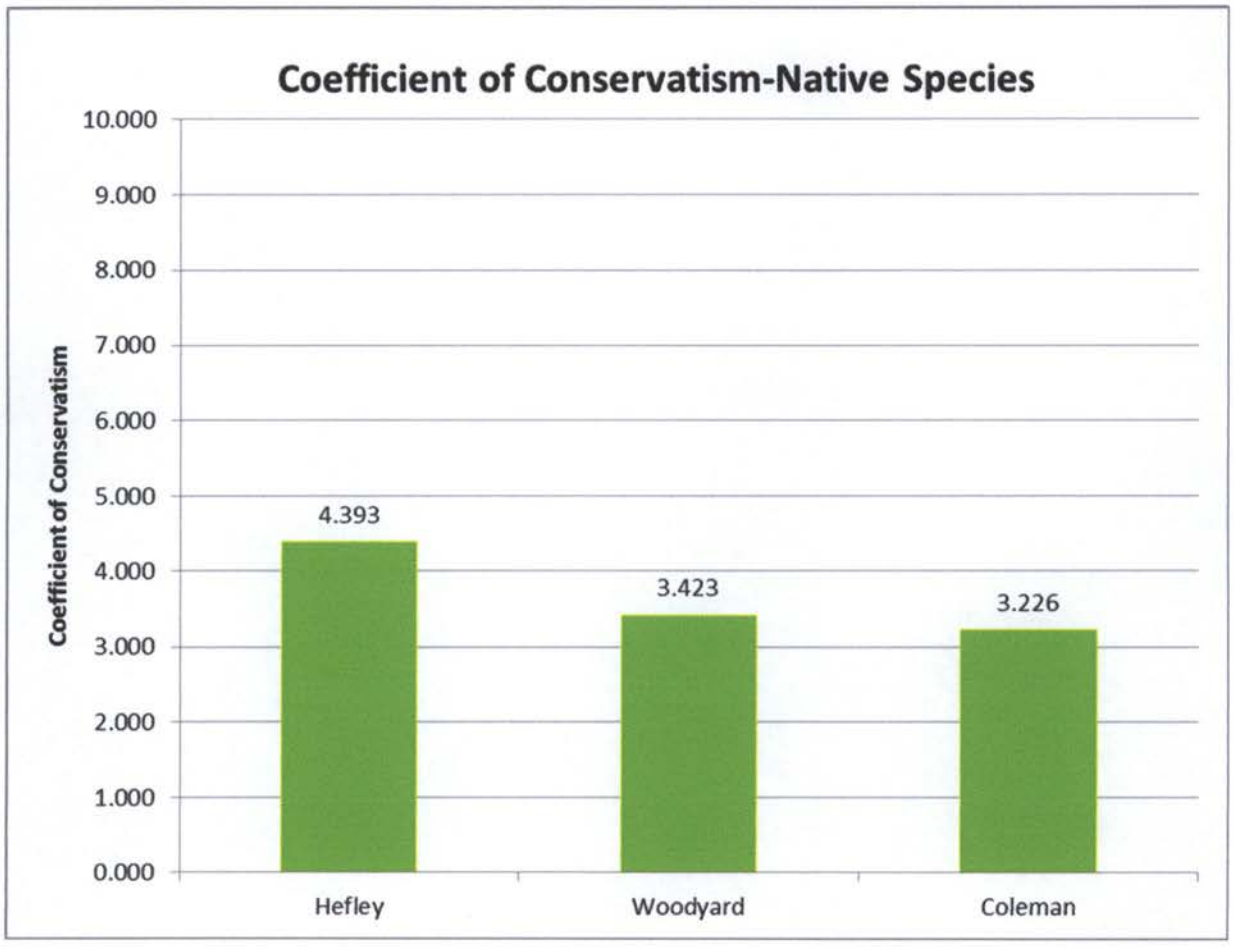

Figure 3. Coefficients of Conservatism was determined by averaging all native species collected and comparing the three study areas. All three research areas fall below state value (Taft et al., 1997).

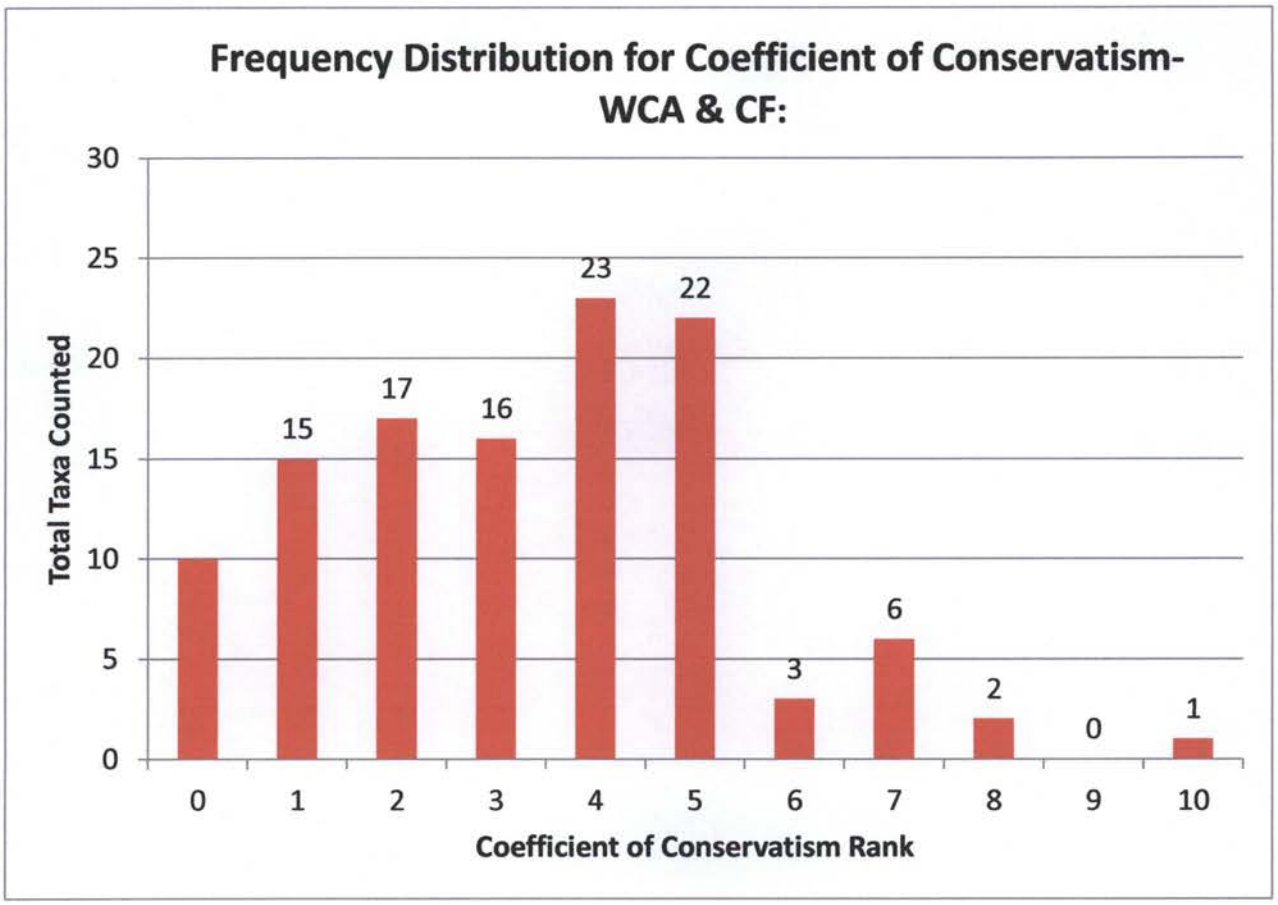

Figure 4. Totals for all native species were tabulated for each coefficient rank. Frequency of occurrence was determined for 114 native species collected at Woodyard and Coleman Farm.

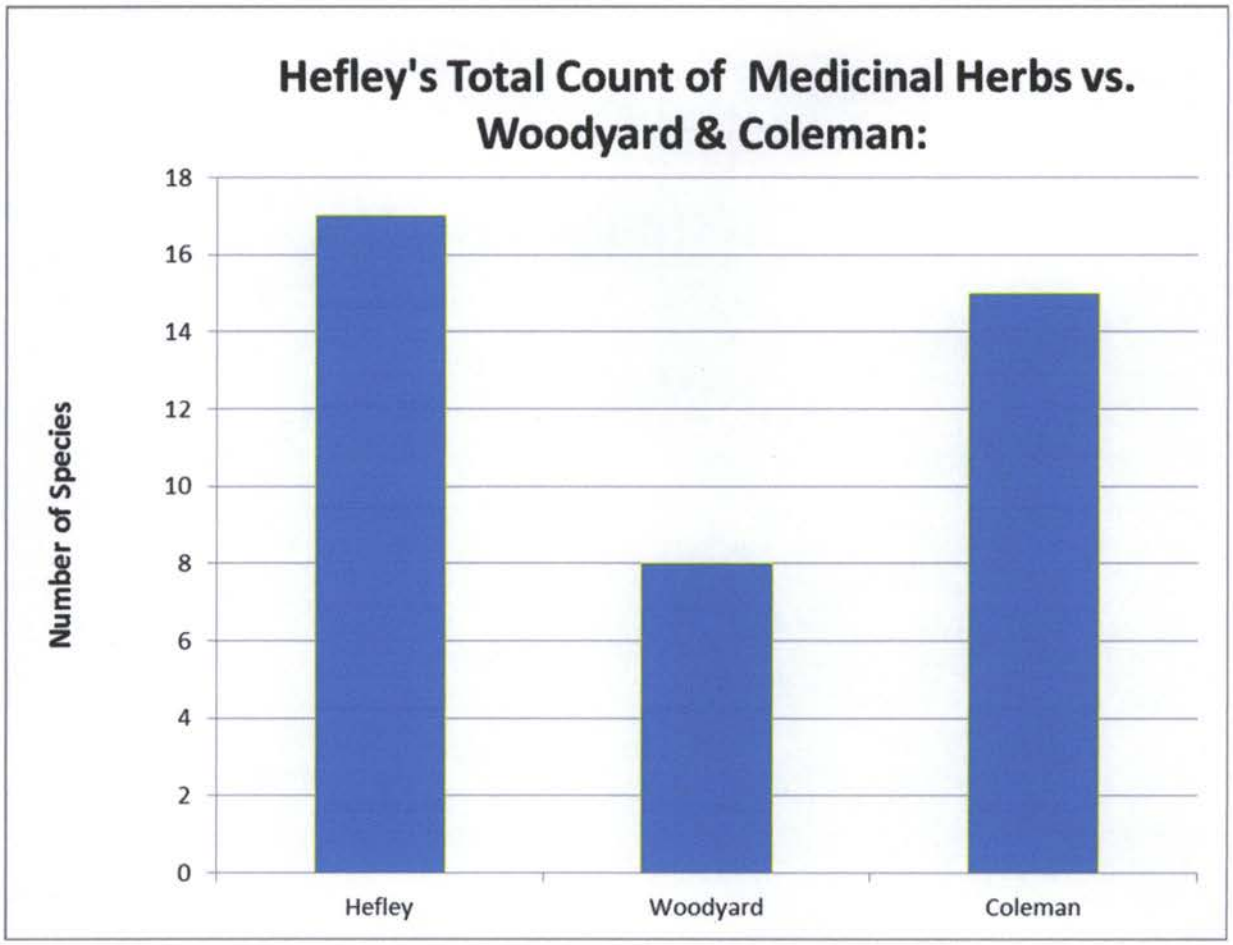

Figure 5. Total count of medicinal herbs found in Hefley's study compared to total plants of same species counted in this study. There were 17 different medicinal herb species found in Hefley's study that were also found at the Woodyard Conservation Area and Coleman Farm. Some forbs counted in the graph above were in the same genus but different species for both study areas in this study.

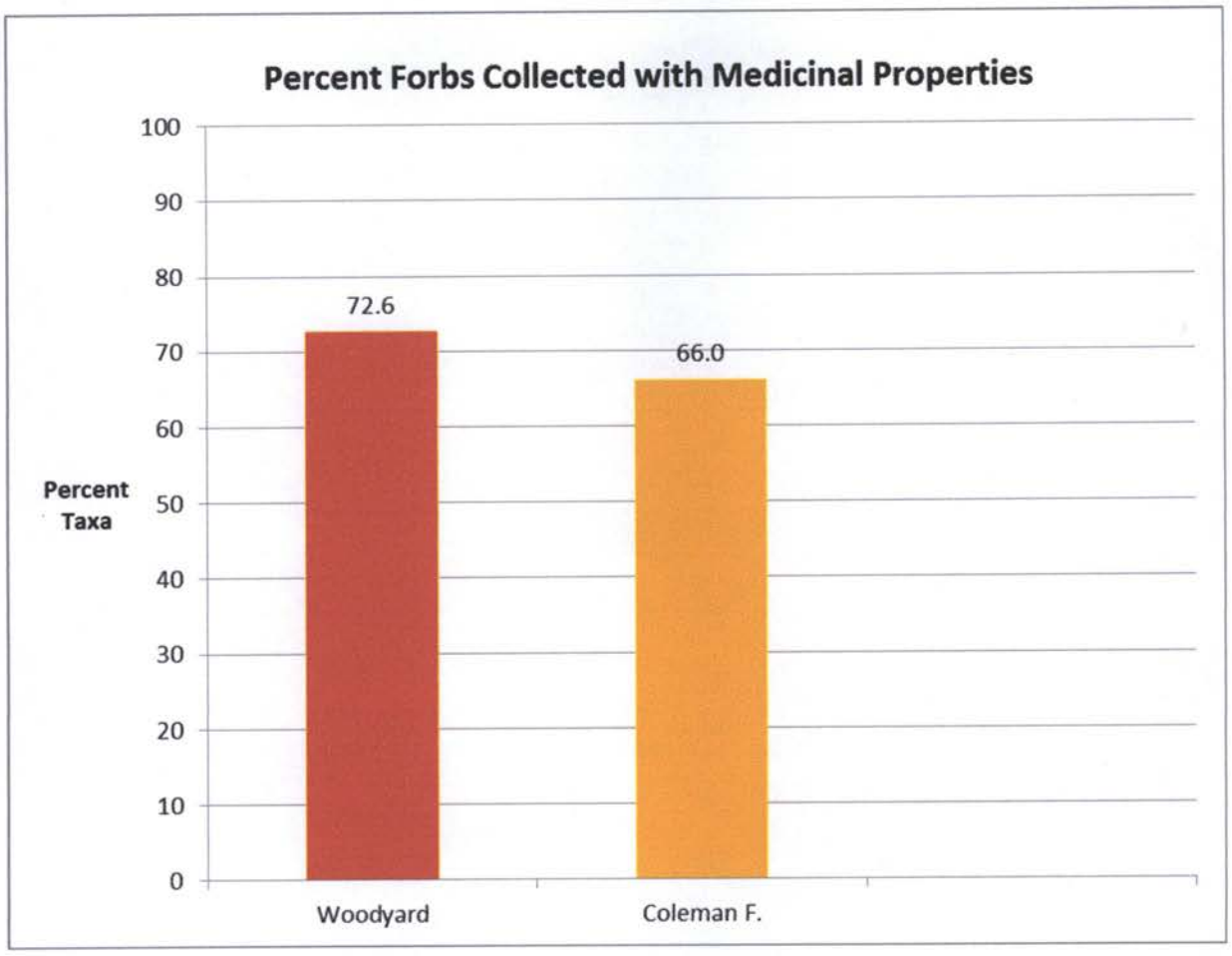

Figure 6. Percent of all prairie herbs collected, natives and non-natives, from both study areas that possess medicinal properties.

Discussion:

In this study 73 species were collected at Woodyard Conservation Area and 100 collected at Coleman Farms. James Hefley collected and analyzed 58 medicinal species in 6 counties, including Coles, in 1987. It was determined that 17 species having medicinal properties were also found at the Woodyard and Coleman sites. In this study, 64 families consisting of 173 species, were analyzed and 70% were found to have medicinal properties. The largest family represented in this study was Asteraceae (synonym: Compositae) with 47 specimens. In the comparison made between Hefley and this study some plants found were in the same genus but different species. These species were still counted in the totals referenced in Figure 5. For example, *Scutellaria lateriflora,* Blue Skullcap, was documented in Hefley's study but *Scutellaria ovata,* Hairy Skullcap, was found on the Coleman Farm. Other species that varied in the Woodyard study area were: *Galium circaezans* and *Galium concinnum,* Wild Licorice and Shining Bedstraw, respectively.

Collection times covered a three year time period, from Spring 2011 through Summer of 2013. Weather patterns varied somewhat. During summer of 2012 there was a drought in August that made collecting difficult, since many species were not growing very well and did not flower. For two years in the Spring of 2012 and 2013, weather conditions were very wet. During the year of 2013, both counties experienced a late spring. With weather fluctuations such as this, collections of certain species were a challenge. However, it is well known that the Grand Prairie of central Illinois has long been known as an ecosystem of dramatic temperature

fluctuations, which made life difficult for many pioneers (Robertson, 1996). Certain medicinal species may not have always been available, especially in the event of severe droughts. This fact, may have determined which species were hardy enough to survive dramatically negative growing conditions. Many of the prairie species were able to survive due to their deep growing root systems. Some plant roots went down into the black soil more than their heights above the ground. This characteristic helped to ensure survival of not only drought, but prairie fires and grazing animals as well.

Coefficient of Conservatism (CC), was determined for native species from all three study areas. Non-native or adventive plants were not assigned a Coefficient of Conservatism since they do not originate in the native landscape. Coefficient of Conservatism values were tabulated for each site and averaged. On a scale of 0-10, a value of 0 indicates that a species is able to grow in very disturbed areas, such as roadside ditches or in areas of high traffic. Conversely, 10 means the herbs are not able to thrive in areas of disturbance at all. A CC value of 0-1 indicate taxa adapted to severe disturbance in which little time is allowed for growth. Values for CC from 2-3 indicate more stable but degraded environments. Species with CC values of 4-6 are able to exist in areas that include a variety of habitats. Coefficient of Conservatism values of 7-8 include species in natural areas that have a small amount of degradation. If a species has a CC value of 9-10 it indicates they are found growing in a high quality natural areas with the inability to thrive in any disturbance. In addition, Floristic Quality Assessment (FQA) utilizes Coefficient of Conservatism as a

means to determine tolerance to disturbance and as a result, assist in attempts to conserve the biodiversity of the prairie ecosystem in central Illinois (Taft et al. 1997).

Land stewardship projects have been designed and dedicated by different states to protect what is left of our natural environment. In Illinois, the goal is to preserve the prairie and other natural areas from the impact of human activities. Plants are studied to determine if they respond as a "generalist", meaning the plant will grow anywhere, including areas such as roadside ditches. More sensitive plants are referred to as being "conservative". These species grow only in specific habitats, (CC =9-10), that are considered to be high quality natural areas. Natural areas include species of a community that originated from virgin pre-settlement vegetation (Taft et al. 1997). In Table 3, this would be areas graded as A or B. Once these plant species are disturbed they will not usually grow back.

Very little natural habitat remains in Illinois, including native prairie areas of central Illinois (Robertson, 2000). It is unfortunate that .07% of the total land area in Illinois is considered high quality and an undegraded, natural condition. (Taft et al., 1997). Hefley's data in combination with the data from this study indicates the study areas did not consist of a high quality natural area.

This study reviewed Species Richness in order to determine total numbers of native versus adventive species growing in the study areas. Table 1 documents the results of Hefley's research concerning Species Richness. Hefley's study of species richness resulted in 76.7% for native species and in this study a value of 59.8%. An additional study conducted by Robertson's documented a percent richness that was

higher, possibility due to sampling of three established prairie sites, in which conservation efforts have encouraged preservation of native species (Robertson, 2000). This study sampled not only prairie areas that varied in size, but included woodland and wetlands, in which more non-native species may have been collected. Robertson also collected data in a 2 hectacre size area that consisted mostly of a prairie ecosystem alone. The drought during the summer of 2012 could also have had an impact on the numbers and types of herbs collected, and as a result affected the outcome of species richness for this study.

A comparison was made of the 3 study sites for Coefficient of Conservatism in order to assess the natural quality of the study sites. The highest value existed from plants analyzed in the Hefley study of 4.393. Hefley's study included a total of 30 species found in a 6 county region that were also found at Woodyard Conservation Area and Coleman Farms. In the study conducted by Taft et al. (1997), the greatest number of species analyzed had a Coefficient of Conservatism of 5.0. (299 plants out of a total of 2,099 species studied in Illinois). The Woodyard Conservation Area and Coleman Farm CC values averaged 3.32. As indicated in Graph 1 Woodyard's coefficient of conservatism value was 3.423 and Coleman Farm consisted of a value slightly lower, at 3.226. In Table 3, Grading of Natural Quality, places the average coefficient of conservatism for native species collected in the moderate to heavily disturbed areas. Most species would resist human activity very well. Many of the species were probably found in higher traffic areas such as roadside ditches or other lower quality natural areas. Frequency distribution was compiled for all native species collected at both sites, Woodyard and Coleman Farm. Individual species were

counted for each coefficient rank indicating a peak of 23 species at 4. This suggests that the herbs collected are fairly tolerant of disturbance and are not found in high quality natural areas. A bell-curve can be seen in the graph, rising from coefficients of 0 to 4 and dropping drastically after 5. The peak at 4, in which most species were found consisted of the following families: Apocynaceae (1), Asteraceae (7), Berberidaceae (2), Campanulaceae (1), Caprifoliaceae (1), Lamiaceae (2), Liliaceae (1), Lobeliaceae (2), Phrymaceae (1), Podophyllaceae (2), Rubiaceae (1) and Scrophulriaceae (1). The most species were found to be members of the largest family, Asteraceae. (In this list of families, all but 4 species were considered to have medicinal properties.) There were 5 species found at 7 and none at 9. However, 1 plant was collected with a coefficient value of 10. The species found on Coleman Farm with this value was *Aster prenanthoides* and also considered a medicinal plant. (Kurz, 2004).

The Coefficient of Conservatism is utilized to determine the Floristic Quality Index (FQI) and provides an evaluation of the natural quality of a site. FQI is a tool that scientists use to determine which species inhabit an area and what their tolerance for disturbance is. The FQI for total species for Woodyard and Coleman (Table 4) indicates degraded with restoration potential. In the Hefley study, the FQI was lower, meaning the areas were definitely degraded. The rankings for FQI-natives was higher for this study, averaging 25 for both Woodyard and Coleman sites. This means both areas were ranked as being close to a quality natural area (25-30) in terms of natives only. However, Mean Conservatism for natives in Hefley's study indicated 4.393 for natives and much lower at 2.16 for adventive species. Perhaps these results

were affected by the fact that he only used medicinal herbs in his study. Both study sites, Woodyard and Coleman averaged 3.32 for Mean Conservatism-natives only. This shows that both study sites were dealing with plants that were tolerant of degradation and did not demonstrate a high quality community of plants. In addition, it was noted that all three study sites were significantly high in the percentage of adventive species. This could indicate that all three locations had experienced the movement of non-natives species into the area(s), pushing out natives due to competition. Hefley's study showed the highest percent of adventives, at 51%. In reviewing the data, all 3 study sites showed a moderately degraded environment, lacking in high natural quality and very few species ranking in Conservatism above 7.

Medicinal Importance of Species Collected:

The valued medicinal action of herbs is due to the presence of over 4,000 specific compounds found in all primary and secondary metabolites (Daniel, 2006). The majority of the world, about 80%, rely upon herb-based medicines (Daniel, 2006). A long history in many parts of the world will document the effectiveness of herbs and their uses in treating diseases of mankind. Plants have uses for the naturally occurring constituents within their molecular structures and man has also found medicinal benefits from the different classes of compounds found in them based on specific actions on the body (Njoku and Obi, 2009). Ayurvedic medicine, whose philosophy is to treat the "whole body" (holistic approach), has for centuries utilized a formulary of herbs in treatments and today uses over 2,000 plants for treatments of

certain ailments (Daniel, 2006). The native American Indians of the US prairies and other regions utilized their own "pharmacy" of treatments for healthy living. A very famous Shawnee woman known as "'Auntie Shawnee" tried to inform the pioneers of the dangers of "milk fever", the condition that supposedly killed Abraham Lincoln's mother. It was not until 1927 that the toxin trematol was isolated from White Snakeroot to document what the Shawnee already knew in the mid 1830's (Austin, 2010).

Plants have historically been used to treat disease and are used as the base of present-day medicines. The medicinal importance of plants is dependent upon the active constituents present which results in a therapeutic property or action. The molecular structures, known as secondary metabolites are complex organic molecules that possess a medicinal component. These metabolites are usually stored in vacuoles of plant cells and are classified as: alkaloids, phenolic compounds, glycosides, volatile oils, saponins, resins, tannins, and bitter principles. One fourth of prescription drugs used today contains at least one chemical compound that originates from plants (Ahmad, 2007).

Alkaloids are alkaline, as the name implies, bitter, and composed of a heterocyclic nitrogenous ring structure. The name refers to the fact that alkaloids are basic in nature. There are 11 medicinal herb families in this study that contain one or more alkaloids. The families in this study that contain alkaloids are: Apocynaceae, Asclepidaceae, Asteraceae, Berberidaceae, Fabaceae, Liliaceae, Papaveraceae, Ranunculaceae, Rubiaceae, and Solanaceae. Hefley collected the medicinal herb, Jimson weed, *Datura stramonium,* which contains .25-.4% of the alkaloid Atropine.

Atropine is a mydriatic compound used in modern medicine to dilate the pupils of the eyes. Another herb found at WCA and CF was Great Lobelia, *Lobelia inflata,* that contains Lobeline, an alkaloid effective as a nauseant and expectorant. However, this plant is considered risky to use as a crude herbal product. Passionflower, *Passiflora incarnata,* collected on CF during summer is a popular herbal sedative in Britain (Robbers and Tyler, 1999) and known to possess the alkaloid, Passiflorine, which has a similar physiological effect on the body as morphine. Other well-known and important compounds that contain various alkaloids are: cocaine, codeine, and morphine.

A very large group are the polyphenols, and they have one thing in common, an aromatic ring structure composed of at least one hydroxyl group. A related group, phenolic acid, is found in all green plants and well known for being antioxidants and anti-inflammatory compounds. *Rubus* spp, black raspberry, and grapes are composed of a related compound to this group, ellagic acid (Ganora, 2012). The largest subclass included with the polyphenols are the flavonoids, in which there are 4,000 different forms (Ganora, 2012). This group serves as important antioxidants for plants during photosynthesis and function as anti-inflammatory, cancer-preventative and cardio-protective agents. An excellent example of an herb collected in this study with these beneficial properties is Elderberry, *Sambucus nigra.* This well-known medicinal plant has anti-inflammatory, anti-viral and anti-cancer properties. Care should be taken to boil the berries before using since they are known to contain cyanide. One study showed the standardized elderberry extract to be useful in shortening the duration of flu by 3 days (University of Maryland-Medical Center, 2012).

Glycosides are found to be abundant in nature and consist of a glucose molecule, glucone and aglucone. Cardiac glycosides are extracted from the herb foxglove, *Digitalis purpurea.* The families in this study that consist of one or more classes of glycosides are: Apocynaceae, Brassicaceae, Fabaceae, Gentiaceae, Liliaceae, Roseaceae, and Scrophulariaceae. Two species of clover, *Melilotus alba and Melilotus officinalis,* collected at Woodyard, consist of coumarin glycosides which act as mild toxins of the nervous system. Dogbane, *Apocynum cannabinum,* a plant known to contain cardiac glycosides, was found at Coleman Farm (Blackwell, 1990). Another amino acid derivative in this group that consists of sulphur and a very well-known herb is the pungent *Allicin* species which includes garlic. In this study the wild garlic, *Allium canadense,* was found on Coleman Farm and considered very useful as a medicinal plant. Allicin and the enzyme Alliinase, both constituents of garlic are known to combat infections and recent studies indicate a tumor preventive action. During WWII Garlic was used for infection when antibiotics were no longer available (Lawson and Bauer, 1998). *Allium canadense,* was used by physician, Father Marquette, who accompanied Joliet to treat various injuries from infection and as a prevention for scurvy (Tucker, 2013).

When discussing volatile oils the family Lamiaceae comes to mind. Volatile oils are volatile aromatic liquids found in the ducts or oil glands of plants. Various oils, essential oils and their constituents are used to fight infections, especially of the respiratory and urinary systems, and to treat burns or wounds. Aromatherapy utilizes many fragrant essential oils to treat physical and emotional conditions. Applications of the oils can be massaged into the skin or inhaled into the lungs, causing the aroma

of the oil to enter the bloodstream and provide a therapeutic effect. One herb collected in this study that has important essential oils is: *Melissa officinalis,* Lemon Balm, which has a lemon scent due to 0.1% volatile oil, one of which is known as Citronellal (Daniel, 2006). This herb is used to calm the nerves and was a folk medicine for insomnia. It also has recently been found to have anti-viral and anti-herpes properties. Another very popular herb found by Hefley, *Mentha piperita,* Peppermint, has a volatile oil content of 1-3% with the main constituent being menthol (30-35%), (Daniel, 2006). Peppermint is used as a carminative, spasmolytic and anti-inflammatory. It is very effective against stomach upset and can also act as a mild sedative. It is extremely popular as a flavoring in food. Other species of mint found in this study are: Wild Mint, *Mentha canadensis* and Eastern Beebalm, *Monarda bradburiana.* Eastern Beebalm was used by the Blackfoot, Ojibwa, and Winnebago Indians as an antiseptic and to treat dental caries. In addition, this herb is a natural source of Thymol, the primary ingredient in mouthwash.

Saponins are a subclass of terpenoids that have the characteristic of producing a foamy, soap-like froth when shaken with water. They have been detected in over 70 plant families and are common in monocots, such as the Liliaceae family. An interesting herb found on Coleman Farm that consists of saponins is Bouncing Bet or soapwort, *Saponaria officinale,* which produces a soapy mixture when added to water. This species acts as a diaphoretic and relieves itching, rheumatism and jaundice. Senega Snakeroot, *Polygala senega,* was used by the Seneca Indians to treat snakebite. This herb contains 5-10% saponins which are an excellent expectorant by reducing the thickness of bronchial secretions (Robbers and Tyler, 1999).

Resins are commonly found in combination with volatile oils in mixtures called oleoresins that are either liquid or semi-liquid in consistency. They are terpene compounds and soluble in water. Tree trunk tapping results in the resin oozing out onto the bark and hardening when it hits the air. An important herb containing resins is Spikenard, *Aralia racemosa,* found at Woodyard Conservation Area and by Hefley. The resins give this plant stimulant and diaphoretic properties, and also effective against pulmonary infections and asthma.

Tannins are polyphenols having astringent taste and are used to turn animal hides into leather. Tannins are found to in seeds, leaves, bark, roots and wood. These constituents of plants are fungicidal, which helps plants to resist infections due to microorganisms. In addition, these components of metabolic waste products from plants are sour and provide antiseptic properties as well as forming a thin layer of coagulation on wounds. Herbs found in this study containing tanninsinclude Yarrow, *Achillea millefolium,* a very medicinally important plant said to have been used by Achilles to treat the wounds of his soldiers. Because of this the herb was called the "soldiers herb". Calamus or Sweetflag, *Acorus calamus,* was found by Hefley and used as a carminative, stomach powder and believed to cure eye problems.

Mucilages, are gelatinous mixtures of polysaccharides that form a slippery, protective coat over mucous membranes. They have a mild taste and are known for swelling in the presence of water. A very famous plant used to treat burns that contains mucilage in its tissue is the Aloe Vera plant. Psyllium and flax are plants that contain mucilage in their epidermis. Black mustard, *Brassica nigra* found by Hefley, was used as a poultice since it was effective in reducing skin irritations.

Conclusion

There is no doubt that numerous species of herbs growing in the Illinois mesic-blacksoil prairie have medicinal properties (Njoku and Obi, 2009). The state of Illinois has been given the nickname "The Prairie State" due to the vast sea of grasses and forbs that once covered the plains (Robertson, 2000). The pioneers of the prairies did not have a drug store to go to in order get treatment for various ailments. They brought with them knowledge from Europe and learned from their Native American brothers what species worked medicinally.

This study set out to inform the reader of the many beneficial uses of everyday herbaceous species growing in the Illinois prairie region of Coles and Clark counties. Many such herbs have been determined to have therapeutic value due to chemical constituents found in the tissues of the herbs studied in this paper. The reader beware, this thesis is not all conclusive and only a "survey" of what history, as well as modern medicine documents. There are many toxic constituents present in the collected herbs of this study. It requires expertise in identification of species and sufficient knowledge of the proper preparation of herbal remedies for their uses to be practiced safely.

In addition, this study analyzes the *natural quality* of 230 specimens (representing 173 species) collected in the central Illinois prairie, which includes data presented in Hefley's study as well. Conservation of the tall-grass prairie of central Illinois is of the upmost importance; what took 50 years to eradicate, may take twice as long to save what little remnant is left today (Robertson, 2006). The prairie is a valuable, biologically diverse ecosystem in many aspects and it is important to preserve it for the education and enjoyment of generations to come.

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APPENDIX

RESULTS-DISCUSSION OF SELECTED SPECIES:

(PHOTOS NOT REFERENCED WERE TAKEN BY Debra A. Welch)

Family: **Apiaceae**-Parsley Family

Scientific Name: *Daucus carota*

Common Name: Queen Anne's Lace, Wild Carrot, Bird's Nest, Devil's Plague

Habitat: fields, roadside ditches, open areas, degraded meadows, fence rows, and prairies.

Native: adventive from Europe; found in all counties of Illinois.

Description: perennial or biennial, stands about 90 cm tall. Finely dissected leaves and alternate. White flowers produced in a flat umbel. Seen from May to October. There is a central purple flower. After fertilization, umbel closes and takes on a cup shape. Root is fleshy white and tap-like in shape.

Constituents: Volatile oil of seeds.

Medicinal actions: diuretic, antiseptic, antifungal, carminative, stimulant, tonic.

Uses: Seeds are carminative, used in treating cancer of the stomach and throat. Infusion of whole herb used to treat dropsy, kidney and bladder infections. Carrot tea used to treat gout. Boiled, mashed root used as a poultice. Root is rich in Vitamin A.

Reference: Hefley (1987)

Family: **Apocynaceae**-Dogbane Family

Scientific Name: *Apocynum cannabinum*

Common Name: Dogbane, Indian Hemp

Image Courtesy of John Hilty

Habitat: moist to mesic blacksoil prairie, thickets, moist meadows near rivers, woodlands, pastures, abandoned fields, this plant favors disturbed areas.

Native: native to Illinois.

Description: perennial, stands 90-180 cm tall. Ovate leaves on main stem are petioled. This family produces a white, milky latex. Flowers are urn shaped and exist in terminal clusters. Blooms from June to August.

Constituents: bitter principle, Symarin of a glucose nature: cardiac glycoside.

Medicinal actions: cardiac stimulant, but more irritating than digitalis, tonic.

Uses: roots and rhizomes are harvested in the fall. Powdered root was used to induce vomiting. Plant was steeped in water to treat intestinal worms, fever, dysentary, asthma, and pneumonia. Root boiled in water made a good laxative.

Caution: may be poisonous.

Reference: Hefley (1987)

Family: **Apocynaceae**-Dogbane Family

Scientific Name: *Arisaema triphyllum*

Common Name: Jack-n-the-Pulpit

Image on left courtesy of John Hilty

Habitat: common throughout Illinois. Shady woodlands and hillsides, moist woods.

Native: yes

Description: perennial, 30-60 cm tall, and leaves are trifoliate with long petioles. There is a stalk or peduncle with one flower at the apex. The peduncle is enclosed in a sheath at the base and shorter than the petiole. The white-green to reddish flower is made up of a spadix and spathe. The spadix is cylindrical, light green and represents the "jack". The spathe covers and flops over the spadix, this is the "pulpit". Flowers bloom from mid to late spring. If cross pollination occurs, red berries develop from each fertilized flower.

Constituents: volatile oil, saponin, alkaloid resembling Coniine.

Medicinal actions: roots-expectorant, purgative, diaphoretic.

Uses: Native Americans used aged root (tea) for arthritis, also treatment of coughs and colds.

Reference: Hilty (2012)

Family: **Araliaceae**-Ginseng Family

Scientific Name: *Aralia racemosa*

Common Name: American Spikenard, Spikenard, Indian Root

Both images courtesy of Ct-botanical-society.org

Habitat: near streams or riverbanks, rich woods, thickets.

Native: yes

Description: Alternate, compound, and ovate shaped leaves. Flowers in numerous umbels (panicle) and greenish-white in color. Plant is a perennial and may reach a height of over 30 cm.

Constituents: bitter volatile oil, resin, and tannin.

Medicinal actions: stimulant, diaphoretic.

Uses: treat colds, coughs, gout, and skin disease. Tincture of the root used to make cough syrup. Also used to treat asthma and pulmonary infections. Pleasant tasting.

Reference: Hefley (1987)

Family: **Asteraceae**-Aster Family

Scientific Name: *Achillea millefolium*

Common Name: Yarrow, Soldier's Woundwort, Bloodwort

Habitat: common to see growing in Illinois fields, mesic to dry prairie, roadsides, and well drained areas. Prefers disturbed areas.

Native: No, naturalized from Europe.

Description: This is a perennial which is 30-60 cm tall. It has alternate leaves, elliptical in outline. Leaves are dissected and fern-like along the stem. Flowers consist of 5 rays with a yellow disk and produced in a flat-topped corymb inflorescence, flowers from May to August.

Constituents: essential oil contains Ceniol and Proazulene; bitter principle-Achelleine.

Medicinal actions: antiseptic, expectorant, stomachic (ceniol). Proazulene known to be an astringent and spasmolytic.

Uses: Ancient Greeks name this sealing plant after Achilles, due to its use in healing wounds of his soldiers. Known to be anti-inflammatory as a poultice. Also used to reduce fever and as a mild tonic.

References: Hefley (1987); ill-inps.org

Family: **Asclepidaceae**-Milkweed Family

Scientific Name: *Asclepias tuberosa*

Common Name: Butterfly Weed



Habitat: perennial forb, dry to mesic sand prairie, blacksoil prairie, abandoned fields and roadsides. Attracts long-tongued bees, butterflies, and hummingbirds.

Native: yes

Description: linear and alternate leaves, flowers in umbel (corymb), orange in color and last from late summer to early fall. Plants are 30-90 cm tall, clear sap unlike other milkweeds, seedpods develop in late summer.

Constituents: Glycosidic principle: Asclepiadin, cardiac glycoside levels are somewhat low compared to other species, several resins, and volatile oils, stems contain caoutchouc.

Medicinal actions: roots used as emetic or diuretic, purgative, diaphoretic, expectorant.

Uses: antispasmodic, infusion made from root powder for asthma and used to treat typhus, was commonly called Pleurisy Root. Roots or stems may be poisonous to livestock.

References: inhs.illinois.edu and Botanical.com (2013)

Family: **Asteraceae**- Aster Family

Scientific Name: *Cichorium intybus*

Common Name: Chicory, Succory, Wild Succory

Habitat: common throughout most of Illinois. Mesic-dry prairies and plants are drought resistant. Grows in pastures, roadsides, railroads, grassy areas, and abandoned fields. Tolerates road salt better than most plants.

Native: non-native from Eurasia and has been spreading since early 1900's.

Description: This is a perennial which is 30-90 cm tall. Leaves are alternate and lanceolate, elliptic, or oblanceolate. Leaves narrow to petiole-like at the base and sessile on stem. Flowers usually blue and closes up by noon. Stem terminates in a long inflorescence that is spike-like or forms a branching panicle. There're 5 petaloid rays, each ending in 5 teeth at the tip of the ray. Light blue stamens with blue anthers. Blooms early summer to fall.

Constituents: unnamed bitter principle, unulin and sugar.

Medicinal actions: tonic, laxative, diuretic.

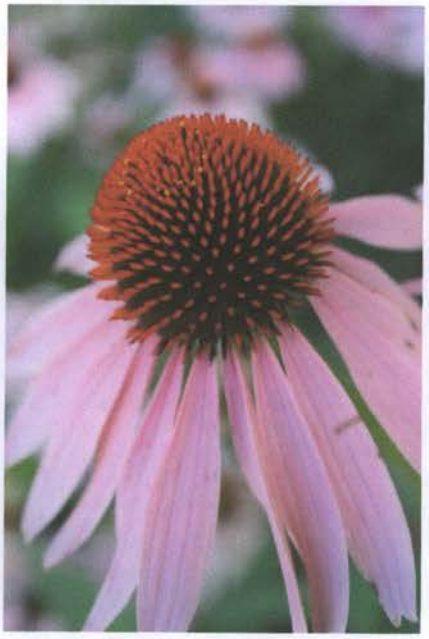
Uses: Used as a food source for man and animals. Decoction of root used to treat jaundice, rheumatism, liver enlargement, and gravel. Infusion used for gout. Has similar properties as Dandelion. Root has a slightly sedative action.

References: Hilty (2012); Grieve (2013)

Family: **Asteraceae**-Aster Family

Scientific Name: *Echinacea purpurea*

Common Name: Purple Coneflower, Broad-Leaved Purple Coneflower



Habitat: blacksoil prairie, dry woods, abandoned fields, and open areas.

Native: yes

Description: perennial up to 100 cm tall, branches some. Light green stems have purple streaks, leaves are alternate and ovate to lanceolate, with petioles slightly winged. Stems terminate in one flowerhead with a long, naked peduncle. Flowers are 10-20 rays with a central yellowish brown disk florets. Blooms mid-summer to fall. Attracts numerous butterflies.

Constituents: oil and resin (wood and bark), Echinacoside, essential oils, alkaloids, inulin.

Medicinal actions: antibacterial, antiviral, antifungal, antiseptic.

Uses: used to strengthen the immune system by increasing resistance, upper respiratory tract infections, used to treat boils, blood impurities, cancer, septicemia, headaches, fever, and most infections. One of the most popular herbs in modern medicine.

References: Hilty (2012); Grieve (2013); Lawson (1998)

Family: **Asteraceae**- Aster Family

Scientific Name: *Eupatorium perfoliatum*

Common Name: Boneset, Thoroughwort, Ague-weed, Joe Pye Weed

Images courtesy of John Hilty

Habitat: common to central Illinois prairies, wet shores, swamp edges, and low wooded areas.

Native: yes

Description: perennial herb 60-150 cm tall. Leaves are opposite, lanceolate and grow together around the stem. Leaves also have a wrinkled appearance with serrate margins. White flowers borne on flat-topped clusters at terminal end of stem.

Constituents: volatile oil, tannic acid, Eupatorin (glucoside), and resin.

Medicinal actions: cathartic, tonic, diaphoretic, and emetic.

Uses: the name implies its use: Indians used to treat inflammation and as a poultice for broken bones. Infusion of leaves and flowers help relieve pain, as well as treatment for malaria and influenza. Tea used as a remedy for colds.

References: Hefley (1987); Hilty (2012)

Family: **Asteraceae**- Aster Family

Scientific Name: *Leucanthemum vulgare*

Common Name: Ox-Eye Daisy, Moon Daisy

Image on right courtesy of John Hilty

Habitat: dry prairie, weedy meadows, wooded areas, roadsides.

Native: no, naturalized to Illinois from Eurasia.

Description: perennial plant which has a central stem that is glabrous and angled. Basal leaves that are oblanceolate and coarsely dentate margins. Central stalk terminates in one flowerhead which is daisy-like with 15-35 white ray florets surrounded by tiny disk florets that are yellow (center). Blooms mid-summer for a month and a half.

Constituents: flavonoids, odor similar to valerian.

Medicinal actions: diuretic, tonic, antispasmodic, bitter taste/tingling.

Uses: treatment for whooping cough, asthma, and nervous excitability.

References: Hilty (2012); Grieve (2013)

Family: **Asteraceae**-Aster Family

Scientific Name: *Silphium laciniatum*

Common Name: Compass Plant, Indian Cup Plant, Turpentine Weed

Habitat: western US, tall-grass blacksoil prairie, commonly seem with Big Bluestem grass

Native: yes

Description: perennial, plant 180-365 cm tall. Basal leaves 12-14" long and half that width, lanceolate, covered in white hairs and deeply lobed. Flowers are monoecious radiate heads, cylindrical, crooked rhizomes, in which transverse section shows large resin cells. Blooms mid-summer to early fall. Stem produces a resin. This plant can live up to 100 years!

Constituents: resinous secretion very much like the resin of *Pistacia lenetiscus*, arabic gum.

Medicinal actions: tonic, diaphoretic, emetic, liver and spleen disorders, Gum is a stimulant and antispasmodic.

Uses: root yields exudation of fragrant bitter gum like frankincense. Chewed by American Indians to sweeten breath. Expectorant for coughs and pulmonary disorders.

Reference: Hilty (2012) and Grieve (2013)

Family: **Asteraceae**- Aster Family

Scientific Name: *Taraxacum officinale*

Common Name: Dandelion, Lion's Tooth, Pissabed, Irish Daisy

Images courtesy of John Hilty

Habitat: very common weedy roadside plant. Found in all counties of Illinois in lawns, degraded meadows, open disturbed areas especially where human activities take place. Often considered a weed in lawns.

Native: naturalized from Europe.

Description: perennial herb consisting of a basal rosette of pinnatifid leaves with wavy, irregular margins. There are 150-200 yellow flowers in a head type inflorescence. Stalks are hollow and have a milky sap. Flowers are located at the apex of a single stalk. Blooms spring through fall.

Constituents: terpenoid bitter compounds-taraxacin and taraxacerin (glycosides), tannins, inulin, provitamin A, minerals, and vitamins B and C (leaves).

Medicinal actions: stomachic, cholagogic (gall bladder disorders), strong diuretic, tonic and nutritive value.

Uses: infusion of plant used as digestive aid, famous as a liver tonic, used to treat rheumatism and arthritis also. Juice from stalks and leaves were used as a cure for warts. Useful as a human food source, especially tender green leaves in salads.

References: Hefley (1987); Hilty (2012)

Family: **Balsaminaceae**- Touch-Me-Not Family

Scientific Name: *Impatiens capsensis*

Common Name: Spotted Touch-Me-Not, Orange Jewelweed, Balsam-Weed

Image on right courtesy of John Hilty

Habitat: occurs in most counties of Illinois, moist woodlands, partially shaded floodplains, edges of woodland paths, swamps, and tolerates disturbance more than most wetland plants.

Native: yes

Description: annual that is 60-150 cm tall with round, glabrous, succulent stems. Leaves are ovate, then textured and hairless. Leaf margins are low and broad. Axels of leaves consist of clusters of 1-3 orange flowers held in a drooping pedicel. Flowers has a characteristic nectar spur. Forms colonies by re-seeding itself. Has an oblong capsule of seeds that explode when touched. Another species in Illinois has yellow flowers. Blooms July to September.

Constituents: tannin, mucilage in the sap.

Medicinal actions: diuretic, emetic, cathartic.

Uses: mucilaginous sap used to treat skin irritations from Poison Ivy and Stinging Nettle. Also determined to have fungicidal properties that has been used to treat Athlete's Foot fungus.

Reference: Hilty (2012)

Family: **Berberidaceae**-Barberry Family

Scientific Name: *Podophyllum peltatum*

Common Name: May-Apple, American Mandrake, Devil's Apple, Duck's Foot

Images courtesy of John Hilty

Habitat: found in every county in Illinois, mesic deciduous woodland, partially shaded hillside seeps.

Native: yes

Description: perennial that is 30-46 cm tall with a single, long leaf on a stalk that looks like an umbrella. Leaves are light green, glabrous and round. Leaves are 1 foot across, orbicular, palmately lobed with dentate margins. The leaves possess 5-9 lobes each. The stalk and leaves are both glabrous. Flowers consist of 6-9 broad, white petals and 4 cm across. Reproductive organs in the center are a pale-yellow color. Blooms mid to late spring.

Constituents: resins-podophyllin, poisonous principle known as podophylltoxin.

Medicinal actions: strong purgative and hydragogue, laxative, anti-tumor.

Uses: powdered rhizomes used as a potent laxative and also possess potent anti-cancer properties. Roots used to treat jaundice, fever, cancer, liver ailments and syphilis. Also used to treat warts.

References: Hefley (1987); Hilty (2012)

Family: **Caprifoliaceae**-Elderberry Family

Scientific Name: *Sambucus canadensis*

Common Name: Elderberry

Image on the right courtesy of John Hilty

Habitat: perennial which is found in every county in Illinois. Exists in mesic blacksoil prairies, open woodlands, moist woodlands near rivers, abandoned fields and ditches or fencerows.

Native: yes

Description: plant is 150-300 cm tall composed of pinnate leaves, ovate shape and serrate margins. White flowers are borne on flat, compound umbels and have a musty fragrance. Blooms in early summer for about a month.

Constituents: flowers-volatile oil; bark-soft resin, viburnic acid, tannic acid; leaves-alkaloid known as Sabucine, resin, glucoside- Sambunigrin, volatile oils.

Medicinal actions: flowers-astringent; bark-diuretic, purgative; leaves-expectorant, diuretic, diaphoretic. Caution: roots are extremely poisonous.

Uses: flowers-famous use as Elder Flower Water and eye/skin ointments; bark-used as a diuretic for cardiac and renal dropsy; leaves-cough medicine and for respiratory ailments. Used to make Elderberry wine.

References: Hilty (2012); Grieve (2013)

Family: **Clusiaceae**-St John's Wort Family

Scientific Name: *Hypericum sphaerocarpum*

Common Name: Round Fruited St. John's Wort

Images courtesy of John Hilty

Habitat: common in many Illinois counties, mesic to dry sandy prairie, hill prairie, thickets, and open areas on roadsides.

Native: yes

Description: perennial up to 76 cm tall and branches from upper axils of opposite leaves. Oblong or lanceolate leaves turned at 90^0 angles as they go up the stem. Underside of leaves lack black dots. Flowers are yellow and occur in many clusters of 5 round petals per flower. Blooms early to mid summer.

Constituents: essential oils, glycoside-hypericine

Medicinal actions: astringent, reduce inflammation.

Uses: oils help in treating irritations such as burns, skin ulcers, bruises and insect bites. Infusion of plants used for infections of lungs and urinary tract. Also treats depression and anxiety.

References: Hefley (1987); Hilty (2012); Lawson (1998)

Family: **Lamiaceae**-Mint Family

Scientific Name: *Mentha canadensis*

Common Name: Wild Mint, Field Mint, Corn Mint

Images courtesy of John Hilty

Habitat: common in central to northern Illinois, edges of marches, moist prairies, grassy areas, waste areas, often found in disturbed areas.

Native: no, naturalized from Eurasia.

Description: perennial, 15-45 cm tall, opposite leaves in hairy leaf axils and square shaped stems. Bell shaped flowers in dense whorls of white, pink or lavender color. Glands produce essential oils with a strong mint odor.

Constituents: essential, volatile oil, important source of Menthol used in medicines.

Medicinal actions: stomachic, carminative, antibacterial, and stimulant.

Uses: popular as a tea and helps alleviate stomachache and popular in treating various digestive problems. Also used to treat bacterial infections, colds, headache,and fever.

References: Hilty (2012); Grieve (2013)

Family: **Lamiaceae**- Mint Family

Scientific Name: *Monarda bradburiana*

Common Name: Bradbury's Beebalm, Eastern Beebalm, Bergamot

Habitat: rocky upland forests, savannas and thickets, pastures and roadsides, common in southern half Illinois.

Native: yes

Description: perennial, 30-60 cm tall, and stems are 4-angled and glabrous. Opposite leaves are sessile against the stem and broadly lanceolate or ovate with serrate margins. Upper part of leaf is finely pubescent. Flowers are dome shaped with a corolla that is deeply divided into an upper and lower lip. Corolla is white or pink with purple dots on the lower lip and white hairs on the upper lip. Blooms late spring to early summer. Attracts bees.

Constituents: essential and volatile oil, source of Thymol.

Medicinal actions: antiseptic, stimulant, and carminative.

Uses: popular among Objiwa, Blackfoot, & Winnebago Indians. Used as poultice for skin infections, mouth and throat infections, dental caries, natural source of Thymol used in mouth wash. Also used for headache and fever.

Reference: Hilty (2012)

Family: **Liliaceae**- Lily Family

Scientific Name: *Allium canadense*

Common Name: Wild Garlic, Meadow Garlic

Images courtesy of John Hilty

Habitat: occurs in every county of Illinois, moist to mesic blacksoil prairie, moist meadows near rivers and woodland thickets, abandoned fields and pastures, and roadsides. Observed in degraded pastures and has low fidelity to any habitat and doesn't do well close to taller forbs.

Native: yes

Description: perennial, 15-30 cm long with rosette of basal leaves that are linear and flat. Round stem that is upright and consists of an inflorescence composed of an umbel of 6-12 flowers. Flowers are white, light pink, or pink. This plant can reproduce by seeds or bulblets. Blooms in early summer. Strong onion odor in the leaves.

Constituents: volatile oil.

Medicinal actions: antibacterial, prevention of insect bites, and diuretic use by the Cherokee.

Uses: Indians used this plant to prevent insect, spider, or scorpion bites. Found to lower blood pressure.

References: Hilty (2012); Lawson (1998); usda.gov

Family: **Liliaceae**- Lily Family

Scientific Name: *Hemerocallis fulva*

Common Name: Orange Daylily, Prairie Lily, Lakota: "mnahca hca"-Very Smelly Flower

Habitat: roadside ditches, near fields, cemetery prairies, waste areas and very widespread in Illinois.

Native: no

Description: perennial, 90-180 cm tall, basal of rosette leaves that are linear, hairless and taper to a point. Tend to bend down and outward. Flowers are orange, very large, and contain 6 tepals that are rolled along the margins. Blooms in mid-summer and lasts about a month. Each flower lasts up to 1 day.

Constituents: Glycosides-9 different forms found in the root.

Medicinal actions: diuretic, astringent, and hemostatic.

Uses: bleeding, poultice for piles. Native Americans pulverized the flowers and applied as a paste to the brown spider (Brown Recluse) bite. Effective in reducing inflammation and swelling immediately. Old leaves are toxic hallucinogens.

Reference: Hilty (2012)

Family: **Lobeliaceae**-Lobelia Family

Scientific Name: *Lobelia siphilitica*

Common Name: Great Lobelia, Indian Tobacco, Pukeweed

Habitat: moist blacksoil prairie, soggy meadows, low areas near bottomlands ,and moist woods

Native: no

Description: perennial, 30-122 cm tall, alternate leaves that are oblanceolate, ovate or obovate. Leaf margins serrate and clasp the stem. Flowers are blue-violet and a narrow bell-shape. Upper lip has 2 lobes and 3 lobes on the lower lip. Blooms late summer to fall.

Constituents: alkaloid- Lobeline, Lobelic acid, resin, gum and lignin.

Medicinal actions: diaphoretic, emetic, and cathartic.

Uses: expectorant, anti-asthmatic, antispadmodic, useful in relaxing the body in the case of tetanus, epilepsy, and diphtheria.

Reference:Hilty(2013)

Family: **Passifloraceae**-Passion-flower Family

Scientific Name: *Passiflora incarnata*

Common Name: Passion Flower, Maypop

Habitat: perennial, aggressive vining plant found from Pennsylvania to Texas. Found along roadsides, old fields and along fences. Can be invasive in some areas.

Native: US

Description: named because of the corona in the center that resembles the "crown of throwns" and the other parts of the flower representative of the Passion of Our Lord. Leaves have 3 lobes, and finely serrated. Tendrils are spring-like. Flowers are purple or flesh colored.

Constituents: Alkaloid: Passiflorine-similar to Morphine.

Medicinal actions: depressant, antispasmodic.

Uses: aerial parts used as a tranquilizer, herbalist recommend for insomnia or anxiety. In homeopathic medicine was used to treat epilepsy. Also used in treating diarrhea, dysentery, boils, and inflammation.

References: Grieve (2013); Peterson (2000)

Family: **Scrophulariaceae**- Figwort Family

Scientific Name: *Verbascum thapsis*

Common Name: Great Mullein, Torches, Jacob's Staff

Habitat: occurs in all counties of Illinois, found in pastures, fallow fields, along roadsides in ditches.

Native: no, native to Eurasia.

Description: biennial plant that consists of a rosette of basal leaves in which the plant grows to a height of 90-213 cm during the second year. Stems covered with downy white hairs and have obovate or oblong-ovate leaves. The upper leaves are decurrent against the stem and lower leaves taper to a narrow end at the base. Central stem terminates in a spike which is covered by yellow flowers. Flowers each have 5 petals. Blooms during mid-summer for a month and a half.

Constituents: leaves-gum, mucilage, resin, volatile oil, and trace of tannin. Flowers-gum, resin, a yellow principle, glycoside, and volatile oil.

Medicinal actions: demulcent, emollient, and astringent properties. Also plant has slight narcotic property.

Uses: leaves smoked in pipe to relieve respiratory ailments. Also used for mucous membrane inflammation, earache, and poultice for hemorrhoids. Mullein oil used to stop gum disease.

References: Hilty (2012); Grieve (2013)

Family: **Solanaceae**-Nightshade Family

Scientific Name: *Solanum carolinense*

Common Name: Horse Nettle, Poisonous Potato, Apple of Sodom

Habitat: very common in Illinois, mesic to dry blacksoil prairie, edge of woodland, abandoned fields, roadsides, railroads and other waste areas. Often found in disturbed areas.

Native: yes

Description: perennial, alternate leaves up to 15 cm long with long petioles. Leaves are lanceolate or ovate, angular along margins, and slightly ciliate. Stem terminate in a cluster of flowers that are star shaped and white or very light purple. In the center of each flower are long, prominent, yellow stamens. Blooms from early summer to early fall.

Constituents: Solanine, Solanidine, and organic acid.

Medicinal actions: sedative, antispasmodic.

Uses: long use by southern Negros to treat epilepsy, infantile convulsions, and menstrual hysteria. Said to have no unpleasant effects.

References: Hilty (2012); Grieve (2013)

Family: **Violaceae**

Scientific Name: *Viola pratincola*

Common Name: Wild Violet, Prairie Violet

Habitat: moist fields, open woods, stream valleys, prairie hillside, roadsides and waste areas.

Native: yes, this is the ***Illinois State Flower***

Description: perennial with heart shaped leaves. Plant bears a single flower on peduncles from leaf axils. Flowers are a violet-blue color. Blooms March to April.

Constituents: leaves high in Vitamins A and C

Medicinal actions: expectorant, strengthens immune system.

Uses: used to treat headache and sore throat, and colds.

Resources: Hilty (2012); dnr.state.il.us

TABLE 1-COLLECTION RECORD					
Woodyard Conservation Area					
FAMILY	**SCIENTIFIC NAME**	**COMMON NAME**	**SP #**	**DATE**	**COMMENTS**
Acanthaceae	*Ruellia humilis*	Wild Petunia	1	7-24-12	Blue/purp flwrs
Apiaceae	*Conium maculatum*	Poison Hemlock	133	6-18-13	Poisonous
	Cryptotaenia canadensis	Honewort	137	6-18-13	
	Daucus carota	Queen Anne's	220	8-3-11	Roadside ditches
	Osmorhiza claytonii	Sweet Cicely	13	7-7-11	Root-anise oil; white flwrs
	Sanicula marlandica	Black Snakeroot	23	7-7-11	
Araliaceae	*Aralia racemosa*	Spikenard	203	6-15-13	Moist woods; medicinal
Asclepiadaceae	*Asclepias incarnata*	Swamp milkweed	160	7-14-11	
	Asclepias tuberosa	Butterfly weed	205,206	8-3-11; 8-2-7-12	Attracts butterflies
	Asclepias verticillata	Horse tail Milkweed	165,207	7-27-11; 6-21-12	
Asteraceae	*Ambrosia artemisiifolia*	Common ragweed	204	8-11-12	
	Anaphalis margaritacea	Pearly Everlasting	62	6-12-12	
	Aster vimineus	Small,white Aster	193	9-15-12	
	Carduus nutans	Nodding Thistle	138	6-18-13	Single pink flower
	Cichorium intybus	Chicory	26, 72	7-5-11;6-21-12	Roadside blue flower
	Cirsium arvense	Canada Thistle	73	6-14-12	Purple flowers
	Coreopsis palmata	Stiff coreopsis	63	8-3-11	
	Erigeron annuus	Fleabane	12, 32	7-7-11; 6-21-12	Tiny wht flower; yellow center
	Erigeron philadelphicus	Fleabane	158	7-14-11	Purple rays
	Helianthus divaricatus	Woodland Sunflower	155, 64	7-20-11; 8-3-11	
	Lactuca biennis	Wild lettuce	98	8-3-11	Causes sleepiness
	Polymnia canadensis	Leaf Cup	116	6-18-13	
	Rudbeckia hirta	Black eyed Susan	64, 135	8-3-11; 6-18-13	Black centers-221

FAMILY	SCIENTIFIC NAME	COMMON NAME	SP#	DATE	COMMENTS
Asteraceae	*Rudbeckia triloba*	Brown-eyed Susan	48	6-12-12	Brown centers
	Silphium integrifolium	Golden Aster	43	8-3-11	
	Silphium terebinthinaceum	Prairie Dock	154	7-20-11	
	Solidago altissima	Tall Goldenrod	27	7-7-11	Yellow flwrs; smooth
	Solidago canadensis	Canada Goldenrod	44, 58	8-3-11; 6-12-12	
	Solidago juncea	Early Goldenrod	162	7-14-11	
	Sonchus asper	Spiny-leaved Sow thistle	125	6-18-13	
	Taraxacum officinale	Dandelion	208	6-14-12	Weed, useful medicinal
Balsaminaceae	*Impatiens capsensis*	Jewelweed	152	7-14-11	Medicinal-treats poison ivy
Berberidaceae	*Podophyllum peltatum*	Mayapple	30	6-1-13	Woods along trail
Bignoniaceae	*Campsis radican*	Trumpet-vine creeper	29,164	7-14-11; 6-12-12	Yellow tube w/dark red
Brassicaceae	*Lepidium virginicum*	Peppergrass	4	6-14-12	Exotic pest
Caryophyllaceae	*Dianthus armeria*	Deptford Pink	38,37	8-3-11;6-12-12	Dark rose flower; hairy
			120	6-18-13	
Clusiaceae	*Hypericum sphaerocarpum*	Common St John's Wort	100	8-3-11	Well known medicinal
Commelinaceae	*Tradescantia virginiana*	Spiderwort	15,130	7-7-11; 6-18-13	
Convolvulaceae	*Ipomoea pandurata*	Wild Potato Vine	40	8-3-11	Lvs heart shaped;yellow flwr
Dipsacaceae	*Dipsacus fullonum*	Fuller's Teasel	161,129	6-21-12; 6-18-13	Lilac flower, egg shaped head
					Invasive; roadside

FAMILY	SCIENTIFIC NAME	COMMON NAME	SP#	DATE	COMMENTS
Equisetaceae	*Equisetum hyemale*	Horsetails	157,121	7-14-11; 6-18-13	Ravine; medicinal
Fabaceae	*Coronilla varia*	Crownvetch	56,209	7-5-11; 6-12-12	Groundcover, wht/pink flwrs
	Desmodium nudiflorum	Naked-Flower Tick Trefoil	150	7-14-11	
	Medicago lupulina	Black Medick	119	6-18-13	
	Melilotus alba Medikus	White Sweetclover	210, 59	6-21-12	
	Melilotus officinalis	Yellow Sweetclover	25,60	7-7-11; 6-12-12	
			128	6-18-13	
	Trifolium pratense	Red Clover	42	8-3-11	
	Trifolium procumbens	Smaller Hop Clover	46	7-5-11	Yellow flowers
Lamiaceae	*Mimulus ringens*	Square stemmed Monkey Flower	54	7-25-12	
	Monarda bradburiana	Eastern Beebalm	159,127	7-14-11; 6-18-13	
	Prunella vulgaris	Self Heal	41,225	8-3-11; 8-27-12	
	Pycnanthemum virginianum	Virginia Mountain Mint	39, 45	8-3-11; 7-5-11	Strong mint odor
	Pycnanthemum tenuifolium	Narrow leaved Mountain Mint	90	8-3-11	Narrow leaves; white flowers
Liliaceae	*Hemerocallis fulva*	Daylily, Wood Lily	31	6-21-12	Orange flwr, no spots
	Smilacina racemosa	False Solomon's-Seal	122	6-18-13	
Lobeliaceae	*Lobelia siphilitica*	Great Lobelia	97	8-6-12	Ravine; blue flower w/stripes
Oxalidaceae	*Oxalis stricta*	Wood sorrel	126	8-3-11	Yellow flowers
Phrymaceae	*Phyrma leptostachya*	American Lopseed	14, 18	7-7-11; 6-12-12	Flops over (seeding)

FAMILY	SCIENTIFIC NAME	COMMON NAME	SP #	DATE	COMMENTS
Podophyllacaeae	*Podophyllum peltatum*	Mayapple, Mandrake	30, 131	6-21-12; 6-18-13	223, white flower
Polygonaceae	*Rumex crispus*	Curty Dock	2	6-21-12	Wavy leaf margins
	Rumexa verticillatus	Swamp Dock	57	7-5-11	
Ranunculacae	*Thalictrum dioicum*	Early Meadow Rue	17	7-7-11	
Rosaceae	*Agrimonia gryposepala*	Tall hairy agrimony	61	8-3-11	
	Geum canadense	White Avens	21, 123	7-7-11; 6-18-13	Large stipules, white flowers
	Geum vernum	Spring Avens	19	7-7-11	Yellow tiny flowers; hairy; petals
					Shorter than sepals
	Geum virginianum	Rough Avens	59	6-12-12	
	Rosa multiflora	Multiflora Rose	136	6-18-13	Fruits only
	Rubus allegheniensis	Black Raspberry	24	7-7-11	Curved prickles
	Rubus pensilvanicus	Black Raspberry	47	7-5-11	
Rubiaceae	*Galium circaezans*	White Wild Licorice	117	7-7-11	Bedstraw
	Galium concinnum	Shining bedstraw	16, 118	7-7-11; 6-18-13	
Scrophulariaceae	*Penstemon grandiflorus*	Large flowered Beard Tongue	134	6-18-13	
Vitaceae	*Vitis riparia*	Riverbank Grape	132	6-18-13	Unripe fruits
Fern:					
Ophioglossaceae	*Botrychium virginianum*	Rattlesnake Fern	20	7-7-11	Wooded trail; ravine

	Coleman Farm				
FAMILY	**SCIENTIFIC NAME**	**COMMON NAME**	**SP #**	**DATE**	**COMMENTS**
Acanthaceae	*Ruellia strepens*	Smooth Ruella	1-5	6-16-13	Purple, trumpet-flower
Apiaceae	*Daucus carota*	Queen Anne's	143	8-27-11	
	Pastinaca sativa	Wild parsnip	170	7-8-11	
Apocynaceae	*Apocynum cannabinum*	Dogbane ;Indian Hemp	168	8-3-11; 6-14-12	
Araceae	*Arisaema triphyllum*	Jack-n-the-pulpit	212	9-15-12	Cluster of red fruit; medicinal
Asclepiadaceae	*Ampelamus albidus*	Bluevine	55	8-6-12	
	Asclepias syriaca	Milkweed	83, 87	6-14-12; 7-10-11	Thigh high; purple flowers
					Big leaves
Asteraceae	*Achillea millefolium*	Yarrow	79	6-14-12	Fern-like leaves
	Ambrosia artemisiifolia	Common rag-weed	101, 141	8-3-11; 8-27-12	
	Aster pilosus	Hairy aster	177, 149	7-11-11; 8-27-11	
			192	9-15-12	
	Aster prenanthoides	Zigzag aster	49	8-1-12	Red stem, purple flowers
	Aster vimineus	Small,white Aster	194	9-15-12	
	Chrysanthemum leucan-themum	Ox-eye Daisy	78	7-10-12	Abundant, yellow center
	Chrysopsis graminifolia	Grass-leaved Golden Aster	177	7-11-11	
	Cichorium intybus	Chicory	115, 120	8-27-11	
	Cirsium discolor	Field Thistle	66	8-27-11	

FAMILY	SCIENTIFIC NAME	COMMON NAME	SP #	DATE	COMMENTS
Asteraceae	*Cirsium vulgare*	Bull thistle	213	8-1-12	Purple flowers; ditches
	Conyza Canadensis	Horseweed	51, 139	8-6-12; 8-27-11	
	Erigeron annuus	Daisy Fleabane	145, 169	8-27-11; 6-14-12	
	Eupatorium coelestinum	Mistflower	182	9-12-12	Blue flowers
	Eupatorium perfoliatum	Boneset	92	7-10-12	Early fall, hairy, medicinal
	Eupatorium rugosum	White snakeroot	191	9-15-12	
	Eupatorium serotinum	Late flowering Thoroughwort	114	8-27-11	
	Helenium autumnale	Sneezeweed	75, 86	7-10-12; 8-3-12	
			184	9-15-12	
	Helianthus divaricatus	Woodland sunflower	99, 195	8-27-11; 9-15-12	
	Leucanthemum vulgare	Ox-eye daisy	78	6-14-12	Abundant, yellow center
	Rudbeckia divaricatus	Black-eyed Susan	144	8-27-11	
	Solidago canadensis	Canada Goldenrod	186	9-15-12	
	Solidago elliottii	Elliott's Goldenrod	146	8-27-11	
	Solidago graminifolia	Lance-leaved Goldenrod	68	8-27-11	
	Solidago juncea	Early Goldenrod	148	8-27-11	
	Solidago nemoralis	Gray Goldenrod	190	9-15-12	
	Solidago rigida	Stiff Goldenrod	173	8-3-11	Good for bee stings
	Solidago speciosa	Showy Goldenrod	181	9-12-12	
	Solidago ulmifolia	Elm leaved	52,69	8-6-12; 8-27-11	
			179	9-12-12	
	Taraxacum officinale	Dandelion	11	6-14-12	
	Verbesina occidentalis	Crown beard	184	9-15-12	
	Vernonia missurica	Missouri ironweed	65, 50	8-3-11; 7-25-12	Purple flowers
Balsaminaceae	*Impatiens capensis*	Spotted Touch-me-not	70, 214	7-10-11; 6-14-12	Near pond's edge; orange flowers

FAMILY	SCIENTIFIC NAME	COMMON NAME	SP #	DATE	COMMENTS
Berberidaceae	*Podophyllum peltatum*	Mayapple, Man-drake	215	6-1-13	Moist woods
Boraginaceae	*Hackelia virginiana*	Beggarslice, stick-seed	174	8-3-11	Parallel veination
	Mertensia virginica	Bluebells	216	4-26-13	Moist woods
Brassicaceae	*Allaria officinale*	Garlic Mustard, Wild Garlic	231	5-1-12	Strong onion odor
Campanulaceae	*Campanula americana*	Tall bellflower	178	7-8-11	Blue flower
	Specularia perfoliata	Venus Looking Glass	107	6-16-13	Tiny dark, purple flower
Caprifoliaceae	*Lonicera japonica*	Japanese honey-suckle	217	6-14-12	White/yellow flowers
	Lonicera maackii	Amur Honeysuck-le	196	9-15-12	Red berries
	Sambucus canadensis	Elderberry	199,229	7-10-12; 7-20-13	White flowers
	Viburnum lentago	Wild raisin	74	6-14-12	Purple fruits
Caryophyllaceae	*Dianthus armeria*	Deptford Pink	95	6-21-12	
	Saponaria officinalis	Bouncing Bet	226	6-25-13	Light purple flowers
	Silene alba	Bladder campion	84	7-10-12	
	Silene stellate	Starry campion	93	7-10-12	
Commelinaceae	*Tradescantia virginiana*	Spiderwort	102	6-16-13	
Convolvulaceae	*Calystegia sepium*	Hedge Bindweed	34	7-7-11	2" white flowers, ar-rowhead
	(Convolvulus sepium)				leaves
Elaeagnaceae	*Elaeagnaceae angusti-folia*	Autumn Olive	176	8-3-11	Invasive species

FAMILY	SCIENTIFIC NAME	COMMON NAME	SP #	DATE	COMMENTS
Euphorbaceae	*Acalypha rhomboidea*	Three-seeded Mercury	187	9-15-12	
Fabaceae	*Lotus corniculatus*	Birdsfoot Trefoil	218	7-25-12	Bright yellow flower
	Medicago lupulina	Black Medick	111	6-16-13	
	Trifolium procumbens	Smaller Hop Clover	76	6-14-12	
	Trifolium pratense	Red clover	7	6-14-12	
	Vicia villosa	Hairy vetch	201	6-25-13	
Gentianaceae	*Sabatia angularis*	Rosepink	153	8-27-11	
Lamiaceae	*Mentha canadensis*	Wild Mint	9	6-14-12	Indians used lvs for tea
	Mimulus ringens	Square Stemmed Monkey Flower	54	7-25-12	
	Monarda bradburiana	Eastern Beebalm	112	6-16-13	Tube-like whit flowers
	Prunella vulgaris	Self Heal	35	7-7-11	Bracts present
	Pycnanthemum virginianum	Virginia Mountain Mint	54	7-25-12	Leaves have minty odor
	Pycnanthemum tennuifolium	Narrow-leaved Mountain Mint	90, 198	7-10-12; 8-3-11	Extremely narrow leaves white flowers
	Scutellaria ovata	Hairy skullcap	88	7-10-12	Blue/purple flowers
	Teucrium canadense	Germander, Wood Sage	85	7-10-12	Pink flowers
Liliaceae	*Allium canadense*	Wild garlic	219	6-1-13	Onion odor
	Hemerocallis fulva	Orange Daylily	202	6-21-12	Orange flowers; no spots
	Trillium recurvatum	Purple Trillium, Wake Robin	211	5-20-12	Moist woods; red-brown flowers
Lobeliaceae	*Lobelia siphilitica*	Great lobelia	71	8-6-11	Purple flowers w/white stripes

FAMILY	SCIENTIFIC NAME	COMMON NAME	SP #	DATE	COMMENTS
Lythraceae	*Lythrum lineare*	Narrow-leaf Loosestrife	230	7-9-13	Roadside ditch, purple flowers
Malvaceae	*Sida spinosa*	Prickly mallow	142	8-27-11	Orange flowers
Onagraceae	*Ludwigia alternifolia*	Seedbox	171	6-14-12	
	Oenothera biennis	Common Evening Primrose	183	9-12-12	Red stem
Oxalidaceae	*Oxalis stricta*	Yellow Wood Sorrel	94, 185	7-10-12; 9-15-12	Yellow flowers
Passifloraceae	*Passiflora incarnata*	Passion flower	166, 3	7-8-11; 6-14-12	Fragrant purple flowers
Phytolaccaceae	*Phytolacca americana*	Pokeweed	6	6-14-12	Purple fruit; edible
Polemoniaceae	*Phlox pilosa*	Prairie Phlox	219	4-26-13	Moist woods
Polygonaceae	*Polygonum cespitosum*	Long bristled	113	6-16-13	Tiny ,dark pink flower
	Rumex obtusifolius	Broad or	81	8-3-12	Broad, basal leaves
	Rumex verticillatus	Swamp Dock, water dock	91	7-10-12	
Portulacaceae	*Claytonia virginica*	Spring Beauty	227	3-30-13	White w/light pink stripes
Ranunculaceae	*Ranunuculus bulbosus*	Buttercup	109	6-16-13	
Rosaceae	*Agrimonia parviflora*	Swamp Agrimony	172	7-10-12	
	Porteranthus stipulotus	American IPECAC	104	6-16-13	

FAMILY	SCIENTIFIC NAME	COMMON NAME	SP #	DATE	COMMENTS
Rosaceae	*Potentilla recta*	Sulphur cinquefoil	110	6-16-13	Light yellow; medicinal
	Rubus alleghaniensis	Black Raspberry	24	7-7-11	Curved prickles
	Rubus pensilvanicus	Black Raspberry	5	6-14-12	Fruit turns red to black; medicinal
Scrophulariaceae	*Penstemon digitalis*	Foxglove Beardtongue	103	6-16-13	Medicinal-heart
	Verbascum Thapsus	Great Mullein, Torches, Hag's taper	200	7-7-11	
Solanaceae	*Solanum carolinense*	Horse Nettle	167	7-8-11	White flowers; bright yellow-bannana like stamens
Urticaceae	*Boehmeria cylindrical*	Small Spike False Nettle	188	9-12-12	
Verbenaceae	*Verbena urticifolia*	White Vervain	33, 53	7-7-11; 8-6-12	
Violaceae	*Viola pratincola*	Wild Violet	228	3-15-13	
Vitaceae	*Vitis riparia*	Riverbank Grape	89	7-10-12	
TREE:					
Fabaceae	*Cercis Canadensis*	Eastern Redbud	8	6-14-12	

Table 2-Coefficient of Conservatism for 3 Study Areas:

Family	*Scientific Name*	*Hefley*	*CC*	*WCA*	*CF*	*Medicinal Properties*
Acanthaceae	*Ruellia humilis*		3	3		
	Ruellia strepens		6		6	
Apiaceae	*Conicum maculatum*		X	X		P-yes
	Cryptotaenia canadensis		1	1		
	Daucus carota	X	X	X	X	P-yes
	Osmorhiza claytonii		3	3		P-yes
	Pastinaca sativa		X		X	P-yes
	Sanicula marlandica	6	6	6		P-yes
Apocynaceae	*Apocynum cannabinum*	2	2		2	P-yes
Araceae	*Acorus calamus*	N	N			P-yes
	Arisaema triphyllum		4		4	P-yes
Araliaceae	*Aralia racemosa*	8	8	8		P-yes
	Panax quinquefolius	7	7			P-yes
Aristolochiaceae	*Aristolochia serpentaria*	6	6			P-yes
	Asarum canadense	5	5			P-yes
Asclepiadaceae	*Ampleamus albidus*		N		N	
	Asclepias incarnata		4	4		P-yes
	Asclepias syriaca	0	0		0	P-yes
	Asclepias tuberosa	5	5	5		P-yes
	Asclepias verticillata		1	1		K-yes
Asteraceae	*Achillea millefolium*	X	X		X	P-yes
	Ambrosia artemisiifolia		0	0	0	P-yes
	Anaphalis margaritacea		X	X		P-yes

Family	Scientific Name	Hefley	CC	WCA	CF	Medicinal Properties
Asteraceae	*Arctium minus*	X	X			P-yes
	Aster pilosus		0		0	K-yes
	Aster prenanthoides		10		10	yes
	Aster vimineus		3	3	3	
	Carduus nutans		X	X		yes
	Chrysanthemum leucanthemum		N		N	P-yes
	Chrysopsis graminifolia		N		N	
	Cichorium intybus		X	X	X	P-yes
	Cirsium arvense		X	X		P-yes
	Cirsium discolor		3		3	yes
	Cirsium vulgare		X		X	yes
	Conyza canadensis		0		0	P-yes
	Coreopsis palmata		N	N		K-yes
	Erigeron annuus		1	1	1	K-yes
	Erigeron canadensis	N	N			P-yes
	Erigeron philadelphicus		3	3		P-yes
	Eupatorium coelestinum		3		3	
	Eupatorium perfoliatum	4	4		4	P-yes
	Eupatorium rugosum		2		2	P-yes
	Eupatorium serotinum		1		1	
	Helenium autumnale		3		3	P-yes
	Helianthus divaricatus		5	5	5	
	Lactuca biennis		4	4		P-yes
	Lactuca serriola	X	X			K-yes
	Leucanthemum vulgare		X		X	P-yes

Family	Scientific Name	Hefley	CC	WCA	CF	Medicinal Properties
Asteraceae	*Polymnia canadensis*		4	4		
	Rudbeckia divaricatus		N		N	
	Rudbeckia hirta		2	2		P-yes
	Rudbeckia triloba		3	3		
	Silphium integrifolium		5	5		
	Silphium terebinthinaceum		4	4		P-yes
	Solidago altissima		2	2		Yes
	Solidago canadensis		1	1	1	P-yes
	Solidago elliottii		N		N	
	Solidago graminifolia		N		N	yes
	Solidago juncea		4	4	4	
	Solidago nemoralis		3		3	yes
	Solidago rigida		4		4	Yes
	Solidago speciosa		7		7	
	Solidago ulmifolia		5		5	
	Sonchus asper		X	X		yes
	Taraxacum officinale	X	X	X	X	yes
	Verbesina occidentalis		X		X	
	Vernonia missurica		5		5	
Balsaminaceae	*Impatiens capsensis*		2	2	2	P-yes
Berberidaceae	*Caulophyllum thalictroides*	8	8			P-yes
	Podophyllum peltatum	4	4	4	4	K-yes
Bignoniaceae	*Campsis radicans*		2	2		yes
Boraginaceae	*Hackelia virginiana*		1		1	

Family	Scientific Name	Hefley	CC	WCA	CF	Medicinal Properties
Boraginaceae	*Mertensia virginica*		5		5	yes
Brassicaceae	*Allaria officinalis*		N		N	
	Brassica nigra	X	X			P-yes
	Capsella bursa-pastoris	X	X			P-yes
	Lepidium virginicum		0	0		yes
Campanulaceae	*Campanula americana*		4		4	P-yes
	Specularia perfoliata		N		N	
Cannabinaceae	*Cannabis sativa*	X	X			P-yes
	Humulus americanus	N	N			
Caprifoliaceae	*Lonicera japonica*		X		X	P-yes
Caprifoliaceae	*Lonicera maackii*		X		X	
	Sambucus canadensis		N		N	P-yes
	Viburnum lentago		4		4	
Caryophyllaceae	*Dianthus armeria*		X	X	X	
	Saponaria officinale	X	X		X	P-yes
	Silene alba		N		N	
	Silene stellate		6		6	K-yes
	Stellaria media	X	X			P-yes
Chenopodiaceae	*Chenopodium ambrosioides*	X	X			P-yes
Clusiaceae	*Hypericum perforatum*	X	X			P-yes
	Hypericum sphaerocarpum		5	5		
Commelinaceae	*Tradescantia virginiana*		7	7	7	P-yes
Convolvulaceae	*Calystegia sepium*	1	1		1	P-yes
	Impomoea pandurata		2	2		P-yes

Family	Scientific Name	Hefley	CC	WCA	CF	Medicinal Properties
Dioscoreaceae	*Dioscorea villosa*	4	4			P-yes
Dipsacaceae	Dipsacus fullonum		N	N		
Elaeagnaceae	*Elaeagnus angustifolia*		X		X	
Equisetaceae	*Equisetum hyemale*		2	2		P-yes
Euphorbaceae	*Acalypha rhomboidea*		0		0	
Fabaceae	*Cassia marilandica*	4	4			P-yes
	Coronilla varia		X	X		yes
	Desmodium nudiflorum		5	5		P-yes
	Lotus corniculatus		X		X	yes
	Medicago lupulina		X	X	X	yes
	Melilotus alba		X	X		P-yes
	Melilotus officinalis	X	X	X		P-yes
	Trifolium pratense	X	X	X	X	P-yes
	Trifolium procumbens		N	N	N	
	Vicia villosa		X		X	
Gentianaceae	*Sabatia angularis*		3		3	yes
Geraniaceae	*Geranium maculatum*	4	4			P-yes
Iridaceae	*Iris shrevei*	5	5			K-yes
Lamiaceae	*Leonurus cardiaca*	X	X			P-yes
	Marrubium vulgare	X	X			P-yes
	Melissa officinalis	X	X			P-yes
	Mentha canadensis		N		N	P-yes
	Mentha piperita	X	X			p-yes
	Mimulus ringens		5	5	5	

Family	Scientific Name	Hefley	CC	WCA	CF	Medicinal Properties
Lamiaceae	*Monarda bradburiana*		5	5	5	P-yes
	Nepeta cataria	X	X			P-yes
	Prunella vulgaris		X	X	X	P-yes
	Pycnanthemum tennuifolium		4	4	4	K-yes
	Pycnantheumum virginianum		5	5	5	P-yes
	Scutellaria lateriflora	4	4			P-yes
	Scutellaria ovata		5		5	
	Teucrium canadense		3		3	K-yes
Liliaceae	*Allium canadense*		2		2	K-yes
	Hemerocallis fulva		X	X	X	P-yes
	Polygonatum biflorum	7	7			K-yes
	Smilacina racemosa		4	4		P-yes
	Trillium recurvatum		5		5	K-yes
Lobeliaceae	*Lobelia inflata*	4	4			P-yes
	Lobelia siphilitica		4	4	4	P-yes
Malvaceae	*Sida spinosa*		X		X	
Onagraceae	*Ludwigia alternifolia*		5		5	
	Oenothera biennis	1	1		1	P-yes
Oxalidaceae	*Oxalis stricta*		0	0	0	K-yes
Orchidaceae	*Cypripedium calceolus*	N	N			P-yes
Papaveraceae	*Sanguinaria canadensis*	5	5			P-yes
Passifloraceae	*Passiflora incarnata*		3		3	P-yes
Phrymaceae	*Phryma leptostachya*		4	4		P-yes
Phytolaccaceae	*Phytolacca americana*		1		1	P-yes

Family	Scientific Name	Hefley	CC	WCA	CF	Medicinal Properties
Plantaginaceae	*Plantago lanceolata*	X	X			P-yes
	Plantago rugelii	0	0			yes
Podophyllaceae	*Podophyllum peltatum*		4	4	4	P-yes
Polemoniaceae	*Phlox pilosa*		7		7	K-yes
Polygalaceae	*Polygala senega*	7	7			P-yes
Polygonaceae	*Polygonum aviculare*	X	X			
	Polygonum hydropiper	X	X			P-yes
	Polygonum cespitosum		X		X	
	Rumex crispus		X	X		P-yes
	Rumex obtusifolius		X		X	yes
	Rumex verticillatus		5	5	5	
Portulacaceae	*Claytonia virginica*		1		1	yes
Ranunculaceae	*Caltha palustris*	7	7			P-yes
	Hydrastis canadensis	7	7			P-yes
	Ranunuculus bulbosus		X		X	yes
	Thalictum dioicum		5	5		K-yes
Roseaceae	*Agrimonia gryposepala*		3	3		
	Agrimonia parviflora		5		5	P-yes
	Fragaria virginiana	2	2			P-yes
	Geum canadense		2	2		
	Geum vernum		1	1		
	Geum virginianum		7	7		
	Porteranthus stipulatus		N		N	K-yes

Family	Scientific Name	Hefley	CC	WCA	CF	Medicinal Properties
Roseaceae	*Potentilla recta*		X		X	K-yes
	Rosa multiflora		X	X		Yes
	Rubus allegheniensis		2	2	2	yes
	Rubus pensilvanicus		2	2	2	
Rubiaceae	*Galium aparine*	0	0			P-yes
	Galium concinnum		4	4		
Scrophulriaceae	*Penstemon digitalis*		4		4	
	Penstemon grandiflora		8	8		yes
	Verbascum thapsus	X	X		X	P-yes
	Veronicastrum virginicum	6	6			P-yes
Solanaceae	*Datura stramonium*	X	X			P-yes
	Solanum carolinense		0		0	P-yes
	Solanum dulcamara	X	X			P-yes
Urticaceae	*Boehmeria cylindrical*		3		3	
Verbenaceae	*Verbena urticifolia*		3		3	yes
Violaceae	*Viola pratincola*		1	1	1	P-yes
Vitaceae	*Vitis riparia*		2	2	2	P-yes
CC Plant Total		123	X	178	200	
Total of Native Plants		28	X	52	62	
Mean Conservatism-Natives		**4.393**	**X**	**3.423**	**3.226**	
Number of Adventives		29		21	38	
Mean Conservatism		2.16		2.438	2.0	
Total Species		57		73	100	
	KEY: K.D. Kurz; P-Peterson					

Table 3. Comparison of Medicinal Herbs in 3 Study Areas: Hefley versus WCA & CF

Scientific Name	Common Name	Hefley	WCA	CF
Apocynum cannabium	Dogbane	X		X
Aralia racemosa	Spikenard	X	X	
Asclepias syriaca	Common Milkweed	X		X
Asclepias tuberosa	Butterfly Weed	X	X	
Podophyllum peltatum	Mayapple	X	X	X
Achillea millefolium	Yarrow	X		X
Convolvulus sepium (Calystegia sepium)	Hedge Bindweed	X		X
*Hypericum perforatum (*Hypericum sphaerocarpum)*	St John's Wort *Round seeded St John's Wort	X		*X
*Mentha piperita (*Mentha candensis)*	Peppermint *Wild Mint	X		*X
*Scutellaria lateriflora (*Scutellaria ovate)*	Blue Skullcap *Hairy Skullcap	X		*X
Melilotis officinalis	Yellow Sweet Clover	X	X	X
Trifolium pretense	Red Clover	X	X	X
*Lobelia inflata (*Lobelia siphilitica)*	Indian Tobacco *Great Lobelia	X	X	*X
Oenothera biennis	Evening Primrose	X		X
*Galium aparine (*Galium circaezans *Galium concinnum)*	Goosegrass *Wild White Licorice *Shining Bedstraw	X	*X *X	
Verbacum thapsus	Common Mullein	X		X
*Solanum dulcamara (*Solanum carolinense)*	Bittersweet *Horse Nettle	X		*X
Daucus carota	Queen Anne's Lace	X	X	X
different species found At marked location				

Biography

Debra Welch lives in Clark County Illinois with her husband and daughter on a farm. She graduated from the University of Missouri-Columbia with a Bachelor of Science in Agriculture in 1981. Ms. Welch received her state certification in high school and junior high sciences from the University of Missouri in 1982. She has taught 27 years in public and private education, teaching all branches of the sciences. She is life certified to teach in Missouri, highly qualified teacher, and certified to teach in the state of Illinois as well. She received her Masters degree from the University of Illinois at Charleston in 2013, with a concentration in Physical Science, in fulfillment of the MSNS program at Eastern Illinois University.

Ms. Welch enjoys competitive, long distance trail riding in order to "fully" enjoy the benefits of the natural environment, often riding up to 50 miles in one day. She rides and shows Morgan and Arabian horses and has combined her love of nature with horses and photography. She took several of the plant pictures shown in the appendix of this thesis. In addition, her hobby is the study of the plant world and the medicinal properties found in plants of all types, especially forbs of the Illinois prairie.