Backyards & Beyond

Winter 2013 RURAL LIVING IN ARIZONA Volume 7, Number 1

The University of Arizona
College of Agriculture and Life Sciences
Cooperative Extension

Featured Plant

Common Name: Parry's agave or century plant
Scientific Name: *Agave parryi*

Susan Pater

Mark Pater, Fire Ecologist, Bureau of Land Management, Safford Field Office

Parry's agave (*Agave parryi*) is a member of the *Agavaceae* (Century plant) family and is native to the southwestern United States (Arizona, New Mexico) and northern Mexico. The genus Agave is from the Greek word agavos for admirable, noble, splendid. This refers to the noble appearance of the century plant.

Agave parryi is a succulent, rosette perennial growing to approximately 3 feet in height and a spread of about 4 feet in diameter. The leaves are grey-green and have a sharp spine at the tip. The flower stalk grows to approximately 15-20 feet in height. The flowers are white to cream-colored, perfect (have both male and female organs) and are primarily pollinated by a variety of bats, hummingbirds and insects searching for nectar. *Agave parryi* plants bloom only once in their life cycle. The plant is also called "century plant" because of this "once a century" bloom occurrence. In truth, the plant lives an average of 20-25 years.

Culturally, this plant has a variety of medicinal, edible and practical uses by native people. The leaves, stem, sap and seeds are all documented as edible. The heart of the plant can be eaten when baked. The young flower stalk, seeds, and tender young leaves are all edible when prepared, generally by roasting. Medicinal uses are listed as an antiseptic, laxative and diuretic. Practical uses include needles, fiber, paper, soap and thatching. *Agave parryi* is also commonly known as a source for the production of mescal or tequila.

From a horticultural perspective, *Agave parryi* can be propagated from seed in well-drained soil and placed in a location that receives ample sunlight and consistent warm temperatures (20°C/68°F). Parent plants also produce offsets or "pups" that can be carefully harvested and propagated to create a new plant. When transplanting into a landscape setting, these plants will grow well in full sun and dry, well-drained soil. Be careful not to transplant into poorly drained soils as this will promote root rot. This plant has a slow growth rate, requires infrequent watering and is an appropriate candidate as an accent plant in xeriscape settings.

URL References:
http://jan.ucc.nau.edu/~plants-c/bio414/species%20pages/Agave%20parryi.htm
http://www.pfaf.org/user/Plant.aspx?LatinName=Agave+parryi

Featured Bird

Common Name: Blue Grosbeak
Scientific Name: *Passerina caerulea*

Dan L. Fischer

Dan L. Fischer - Author of *Early Southwest Ornithologists*, *1738-1900*, University of Arizona Press

An opportunity to observe a pair of Blue Grosbeak is relatively uncommon except during the nesting season. They may be in the vicinity together, but the male, attired in dark blue spring plumage with cinnamon wing-bars, appears quite conspicuous by comparison to the often overlooked, rather dull brown female. Their sexual dimorphism is sharply pronounced by the contrasting blue of the male, and since there is no pigment for that color in most birds, it is revealed to us by light filtered through rather thin layers or a series of surface feathers. The feather structure contains fine suspended cells thought to produce the blue reflected light. Following a fall molt of brown they forego a spring molt unlike most birds. Then, in winter, their plumage transforms through feather wear into a vibrant blue.

Each year, toward the middle of May, the Blue Grosbeak is one of the last birds to return from Mexico to Arizona. Their presence is generally first noticed by their distinctive call note that sounds similar to a metallic *pik* or *clink*. Remaining scarce and shy, their activity becomes more apparent as the monsoon rains begin. Then, solitary males suddenly appear and begin singing a rich strain of clear melodious phrases from a topmost branch among willow, cottonwood or mesquite thickets.

Nesting follows quickly and continues into early September. Both parents participate in nest building and feeding the young. Usually four, slightly glossy, pale blue eggs are laid in a cup nest and are incubated for about twelve days. The young fledge in about ten days. Their diet at this time is largely dependent on the resources that result from the summer storms. A successful second brood is no doubt dependent on these vital rains. Blue Grosbeak are sometimes hosts to the unconventional way of brood parasitism by the Brown-headed Cowbird where the female lays her eggs in the nest, leaving her chicks to be fostered.

Blue Grosbeak occur in the more southern regions of the United States and south into Mexico to Costa Rica. Their distribution is fairly widespread across Arizona in favorable riparian habitats with greater densities appearing in the southeastern portions of the state.

It is little wonder then, that the discovery of the Blue Grosbeak was first brought about by Mark Catesby (1682-1749), an Englishman, who during the latter part of the eighteenth century, contributed the best and most detailed book during that period on the natural history of the New World. He explored the east coast of colonial America and the Bahama Islands. After discovering the bird in Carolina, he created with great artistic ability a drawing calling it "The blew Gross-bec" and placed it among branches of a sweet bay or swamp magnolia. Carolus Linnaeus, after refining bird nomenclature in 1758, used Catesby's plate and description when he applied its species Latin term *caerulea* meaning "blue." The mandible size reference of the Grossbeak is from the French terms *gros*, "large" and *bec*, "beak." The generic name of *Passerina* is of Latin origin meaning "sparrow-like."

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Jody Dingle

WHAT YOU SHOULD KNOW

when you're having your septic system inspected for the *transfer of ownership* program

Kitt Farrell-Poe, Water Quality Specialist;, CALS Ag & Bio Systems Engineering Department, University of Arizona
Jake Garrett, Gila County Environmental Health Department Director;
Dawn Long,CEO American Septic Service

Did you know that in Arizona when you go to sell your house with an onsite wastewater treatment system (septic system), or a property without a dwelling but possessing an onsite system, that you must have it inspected by a qualified Transfer of Ownership Inspector? Did you know that this inspection is required by Arizona law and *cannot be waived by the buyer, seller, real estate agents, loaning agency, or title company?* What are your responsibilities as the buyer, the seller, the real estate agent? How do you know if you have obtained a qualified inspector? This article will provide useful information on the Transfer of Ownership Inspection for onsite wastewater treatment systems.

Aquifer Protection Permit (APP) Program

All onsite wastewater treatment systems are regulated under the Arizona Department of Environmental Quality's (ADEQ's) Aquifer Protection Permit (APP) program as a general permit. In Arizona, you are required to have an Aquifer Protection Permit if you own or operate a facility that discharges a pollutant to the land surface or above a drinking water source. Each home with an onsite system is required to have a valid Aquifer Protection Permit. You should have a permit on file at your county Environmental Health Department. This is the permit that is transferred when a property changes ownership and a completed *Notice of Transfer* form is filed.

NOTICE OF TRANSFER PROCESS

Qualified Inspector inspects facility within 6 months before property transfer

↓

Inspector completes *Report of Inspection* and gives to Seller

↓

Prior to property transfer, Seller gives *Report of Inspection* to Buyer with any other facility documentation in Seller's possession

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Buyer submits *Notice of Transfer* form with fee to proper agency within 15 days after date of property transfer

Figure 1. Notice of transfer process. Source: ADEQ, Form GWS 431, 2009

Transfer of Ownership Inspection

Arizona's statewide inspection program for onsite wastewater (septic) treatment facilities began on a limited basis in January 2002 and was fully implemented in July 2006 to include all onsite systems (conventional or alternative) whenever ownership of the property changes. Typically, the transfer of ownership inspection is triggered by selling your home either on your own or with the assistance of a real estate professional. The only exception to not having a Transfer of Ownership inspection performed on your property with an onsite wastewater treatment facility is when the system is new and hasn't been used before selling the house and/or property. This means that unless your septic system wasn't used before selling your home, you must, by Arizona law, have the septic system inspected by a qualified inspector using the State reporting form [http://www.azdeq.gov/environ/water/permits/download/inspection.doc] (or, in the case of Pima County, a county-approved reporting form [http://www.deq.pima.gov/pdf/Water/ReportOfInspection.pdf]).

Responsibilities of the Seller

Within six months *before* the property is to be sold and you are the seller of the property, you are responsible for obtaining a qualified inspector to perform the inspection. You or your agent can find qualified inspectors at the ADEQ website [http://www.azdeq.gov/environ/water/engineering/not.html], the National Association of Wastewater Transporters (NAWT) website [http://www.nawt.org], or your County Environmental Health Department (some counties in Arizona maintain a list of inspectors approved in their county). Note: at this time, ADEQ does not maintain a separate list of qualified inspectors, but refers directly to the NAWT website.

As the seller, you will receive a completed *Report of Inspection* from your inspector. This report acts as the full disclosure for the onsite wastewater treatment system. It does not guarantee compliance with the local building codes and is not a guarantee that the system will work in the future. The inspection and report discloses the conditions at the time of the inspection. If the house is not sold within in six months of the inspection, a new inspection is required.

Before the closing date of the property, you provide the buyer with the completed report AND any other documents that relate to the permitting, operation, or maintenance of the septic system including septic tank, soil treatment area, or alternative onsite wastewater treatment units. There is no requirement to share the report with ADEQ or the local county permitting agency. If the property does not sell within the six-month period, then a new inspection will be required. Talk with your inspector to find out their policy of providing the new inspection. There are companies who provide these additional inspections for low or no cost.

QUESTIONS TO ASK OR PROCEDURES TO FOLLOW AS THE SELLER

(Adapted from the Arizona Onsite Wastewater Recycling Association Templates [http://www.azowra.org])

- What are the inspector's professional qualifications (license, certification, education)?
- What is the inspector's business experience (years, specific experience, factory training, manufacturer training, liability insurance, worker's compensation)?
- References (ask for 3 references from customers that have used their services; check with the Better Business Bureau, Chamber of Commerce, Angie's List (online) for complaints.
- Does the inspector or his/her company belong to any professional organizations (Better Business Bureau (BBB), Chamber of Commerce, Arizona Environmental Health Association (AZEHA), AzOWRA, National Wastewater Transporter Association (NAWT))?
- What services are provided or not provided by the inspector?
- What will be required of me (the seller) (access, padlocks, fences, power on, water on, dog, landscaping)?
- When and under what terms is payment due?
- Will you or the inspector be contacting the local County Environmental Health Department to obtain permitting records or will you or the inspector be submitting a statement that there are no records?
- What documentation will you and/or the inspector provide to the buyer (photos, reports, sketches, as-built drawings)?
- Did the inspector provide a thorough description of the onsite wastewater facility, including photos for documentation?
- Has the inspector checked any "unable to locate or unable to find" boxes on the form? If so, were there adequate explanations or descriptions?
- If the inspection is older than 6 months of the sale, what provisions will the inspector make (reduced fees, for example)?

Responsibilities of the Buyer

Within 15 days of the purchase of the home, the buyer must submit a completed current version of the *Notice of Transfer* form (ADEQ form GWS 431; http://www.azdeq.gov/environ/water/permits/download/presale.doc) with the required fee (currently $50) to ADEQ or the appropriate county authority (page ii of the form has the instructions for filing the completed form and fee). This can be accomplished in person, by mail, or online [http://www.azdeq.gov/environ/water/permits/onsitenot.html]. Information from the Report of Inspection form is needed to complete the Notice of Transfer form.

QUESTIONS TO ASK OR PROCEDURES TO FOLLOW AS THE BUYER

(Adapted from Arizona Onsite Wastewater Recycling Association Templates [http://www.azowra.org])

- Did the seller retain a qualified inspector?
- Was the septic tank pumped?
- Did the inspector use the required form (ADEQ form GWS 432) & was it the most current version (see http://www.azdeq.gov/environ/water/permits/download/inspection.pdf)
- Did you receive all the documentation for the septic system (permitting, operation, maintenance records) or receive a statement from the County Environmental Health Department that there are no records?
- Did you receive a scale drawing of the wastewater system showing the location of the treatment tanks and equipment, the primary dispersal area, and the reserve dispersal area?
- Were any repairs recommended?
- Were there explanations for any items marked as "not determined" or "unable to find"?

Responsibilities of the Real Estate Agent

The real estate agent should assist the seller in obtaining a qualified inspector and making sure that the completed *Report of Inspection* is provided to the buyer. He/she can facilitate the buyer in filing the required forms.

Responsibilities of the Inspector

The inspector must 1) know about the system that they are inspecting, 2) hold a certificate of training from an ADEQ-approved course, and 3) hold a current license in one of 5 categories. The inspector should follow standard inspection procedures and must use the most current ADEQ form GWS 432 *Report of Inspection of an on-site wastewater treatment facility* [http://www.azdeq.gov/environ/water/permits/download/inspection.doc]. He/she must complete the form and provide it to the seller or seller's representative. The person inspecting the system needs to be a qualified inspector and sign the completed report.

How do you know if a person is *qualified* to perform an inspection?

There are three major steps in qualifying to be an inspector for the Transfer of Ownership Inspection Program:

1. The inspector must have a working knowledge of the type of onsite wastewater treatment facility that they are to inspect. Therefore, it is important that the seller ask questions of the inspector, ask for references, and check the Better Business Bureau. It is difficult to determine if the inspector knows about his/her type of treatment system (not all inspectors know all types of septic systems, especially alternative systems).

2. The inspector must take an ADEQ-approved course and pass a certification exam. Currently, the only ADEQ-approved course is through National Association of Wastewater Transporters which requires continuing education. Therefore, as long as there is only the one course approved for the Transfer of Ownership Inspection training, inspectors must abide by the approved course requirements. To find out if your inspector holds a current certificate, locate his/her name at http://www.nawt.org.

3. The inspector must be licensed in at least one of the following categories:

   a. Arizona-registered engineer (to check current registration status: http://www.btr.state.az.us/ >> Professional Registrant)

   b. Arizona-registered sanitarian (to check Arizona's registered sanitarians in good standing: http://www.azdhs.gov/phs/oeh/rs/pdf/sanreg.pdf)

   c. An owner of a vehicle licensed under ADEQ rules to pump or haul septage (or an employee of the person holding the license), sometimes known as a pumper (to check for ADEQ-approved septic haulers: http://www.azdeq.gov/environ/water/engineering/not.html >> List of Approved Septic Haulers)

d. Arizona-registered contractor with one or more of the following licenses: A, A-12, B-4, C-41, KA, K-41, and/or L-41 (to check current registration status: http://www.azroc.gov/forms/contractorsearch.html)

e. Arizona-certified wastewater treatment plant operator (to check if current certified operator: http://www.azdeq.gov/databases/opcertsearch.html)

Remember, ***all inspectors*** need to have taken an ADEQ-approved course. Currently, only the National Association of Wastewater Transporters provides ADEQ-approved courses. A database of current trained inspectors is found at the NAWT website [http://www.nawt.org].

What should you expect from a Transfer of Ownership inspection?

Once you arrange to have your inspection performed, the inspector may contact you regarding permitting, operating, and maintenance documentation – or he/she may not. The permitting documentation is public record. The operating and maintenance documentation may be submitted by the seller separately to the buyer.

You should expect your inspector to contact your County Environmental Health Department and obtain any records for your wastewater system or include a statement from the county that there are no records on file.

You should expect to have your septic tank lid removed. It is highly recommended that this is done. It is very difficult to see into the corners and bottom of the tank and underside of the lid without removing the lid. A thorough inspection of the tank integrity is important to protecting our groundwater resources and your soil treatment system. We don't want sewage escaping into the surrounding soil, and we don't want groundwater going into the tank and then into the soil treatment area – that adds way too much water to your soil treatment system.

You should expect to have your septic tank pumped. Pumping all the materials out of the septic tank allows the inspector to look at the integrity of the tank (see if there are any cracks, exposed rebar, damaged baffles, and signs of overuse). There are only three reasons that you wouldn't have your septic tank pumped as part of your inspection:

1. If the onsite wastewater treatment system was put into service within the last year (i.e., it is a brand new system, less than a year old) (keep in mind that you can still have the septic tank pumped to prove to the buyer that the tank is in good repair);

2. Because of the manufacturer's written operation and maintenance instructions; and

3. No accumulation of floating and settled waste was present in the septic tank.

You should expect to have your soil treatment area inspected for ponding and spongy or damp soil surfaces over the distribution lines. Many times the inspector will send a camera into the distribution lines to see if there are any obstructions, blockages, roots, or cracks.

Your final Report of Inspection *should include* a scale drawing of your system as it is installed on your property (sometimes called an "as-built"). This drawing should include the treatment tanks and equipment, the primary dispersal area, and the reserve dispersal area. Your report should be signed by the person who performed the inspection, not his or her boss, supervisor, or colleague.

Your system will be listed as "Functional," "Functional with Concerns," or "Not Functional." Note that there is no "passing" or "not passing" an inspection. If repairs are recommended in the *Report of Inspection*, you will not need to have them done before the inspection report is completed. Any decisions to have repairs completed on the onsite system are between the buyer and the seller (not the inspector). It should be noted that the buyer, through receiving the report, has now been fully informed regarding the operational status of the system being transferred and therefore assumes full responsibility should problems arise in the future.

Do *all* onsite wastewater systems involved in a transfer of ownership transaction need an inspection?

Yes, WITH one exception. If ADEQ or a Delegated County Environmental Health Department has issued a Discharge Authorization for the onsite system but the system was not used before the property was transferred, a transfer of ownership inspection is not required. ***BUT the new owner will still need to submit a Notice of Transfer form.*** For example, if you are buying property and/or home with an onsite wastewater treatment system from a builder and the onsite system was not put into service, the builder does not have to have a transfer of ownership inspection prior to the sale, but you will have to file a *Notice of Transfer* form and fee.

What should you do if the *Transfer of Ownership* process isn't followed?

All homes with onsite wastewater treatment systems are required to be inspected prior to the house being sold unless the system wasn't used before the property was transferred (see information above). No one can waive their responsibility for having the property inspected. The buyer is subject to fines if the *Notice of Transfer* is not completed. ADEQ is responsible for setting the fines and penalties.

If you suspect that your onsite wastewater treatment system was not properly inspected, contact both your county environmental health office and your real estate agent to let them know.

Summary

The Transfer of Ownership Inspection Program is designed to provide full disclosure on the functionality of the septic system at the time of the inspection. The seller of the property hires a qualified inspector within six months of selling the house. The inspector inspects the entire septic system, including looking into the septic tank, and submits a signed *Report of Inspection* (a State form) to the seller. The seller then provides the report to the buyer along with any other maintenance or manufacturer documentation. Within fifteen days of the sale of the property, the buyer submits the *Notice of Transfer* to the State.

Bagrada Bug

A New Pest for Arizona Gardeners

JOHN PALUMBO

Stacey Bealmear
Assistant Agent, Urban Horticulture, Yuma County
Peter Warren
County Extension Director & Associate Agent, Urban Horticulture, Pima County
Kelly Young
Assistant Agent, Horticulture, Maricopa County
University of Arizona, CALS Extension

Introduction

The bagrada bug *Bagrada hilaris* (Burmeister) (aka painted bug) was first found in California in June of 2008 and was officially identified in Yuma Arizona in September of 2009 (Palumbo and Natwick 2010). Since then it has been confirmed in many other parts of Arizona including La Paz, Maricopa, Pima, Pinal, and Yuma counties. This is a new pest insect that is native to Africa, India and Pakistan among others (Palumbo and Natwick 2010). The bagrada bug is in the order Hemiptera and family Pentatomidae. Similar to others in this order, the bagrada bug has piercing-sucking mouthparts which are used to ingest plant juices, similar to a straw. These insects are sometimes mistaken for harlequin bugs *Murgantia histrionica*. While these two insects are in the same family, they are two different genera and species. The bagrada bug is smaller than the harlequin and has a different color pattern (Halbert and Egar 2011).

Biology

Adult bagrada bugs are 5-7 millimeters long with a shield like body (Palumbo and Natwick 2010). They are black with orange and white markings. While they have wings, they are more commonly seen walking than flying (Gunn 1918). Nymphs are smaller versions of the adult but lack wings and go through five stages of development. Newly hatched nymphs are an orange-red color and get darker as they molt into later instars (Halbert and Egar 2011). Eggs are creamy-white but change to orange as they develop. They are oval-shaped with a band that gives it the facade of a lid (Gunn 1918). Eggs are commonly deposited in the soil but can occasionally be found on host plants. Eggs can take five to eight days to hatch and 100 eggs can be laid in two to three weeks by a single female (Infonet-Biovision 2012). Like other pentatomids, bagrada bugs gather together in large clusters. As many as 2,000 nymphs of different instars have been seen feeding on a single cabbage plant (Gunn 1918). Length of life cycle varies depending on temperature with several generations per year possible (Halbert and Egar 2011).

In its native India, bagrada has four generations per year (Gunn 1918). Length of the nymphal stage varies but is on average 16 days long. Adult females live longer with a total life cycle (eggs to adult death) averaging 25 days compared to males who live an average of 19 days (Tiwari and Saravanan 2009). Under desert growing conditions, their activity seems to peak twice a year, fall (Sept-Oct) and again in the spring (May-June). This is due to two factors; 1) temperature, higher numbers are seen with higher temperatures (avg. 85-90 F) and 2) host plant availability.

Damage

Nymphs and adults cause feeding damage on leaves and the growing points of plants. Initial damage to leaves is observed along the margins as stippling, or small tan or white dots left where the leaves were pierced by insect mouthparts and the juices sucked out. If feeding pressure is severe

enough, the stippled areas merge and the leaf eventually wilts and dies.

Although damage attributed to bagrada bugs has been observed in corn, cotton, potatoes plus other crops and weeds (Singh and Malik 1993), members of the plant family Brassicaceae have been more heavily affected in home gardens. The brassicas include many cool season vegetables, such as kale, mustard, cabbage, arugula, broccoli, cauliflower, radishes, and brussel sprouts. Bagrada bugs feeding on the growing points of certain crops, such as broccoli and cauliflower, may result in a symptom called "blind head", where no edible crown is produced (Palumbo and Natwick 2010). Blind head or multiple heads may not be evident until significant investment in plant care through watering and fertilizing has been made.

Management

Most research to date has been about managing bagrada bugs in large-scale agricultural crops. The successes in this area are attributed primarily to pesticide applications containing pyrethroids (Palumbo 2011). While these insecticides can be effective, many home gardeners request non-chemical methods.

Cultural practices that may be used to manage bagrada bugs in home gardens or community garden plots include the following.

- Monitoring weekly to look for egg-laying sites on the leaves or in the soil.
- Hand picking early in the season to reduce populations.
- Cultivation of soil surface to destroy eggs.
- Removal of old crop debris and weeds in the family Brassicaceae (formerly family Cruciferae) where bugs may seek refuge.
- Soapy water solution can be effective against bagrada bugs by washing young bugs off the plants but this is not a long-term solution since they will come back once the plant is dry.
- Alyssum is a known host plant of bagrada bug. If you have this flower in your yard, consider monitoring it for bug damage, or removing Alyssum if you want to grow cole crops.
- Installation of lightweight fabric row covers may help with the establishment of susceptible direct seeded plants.

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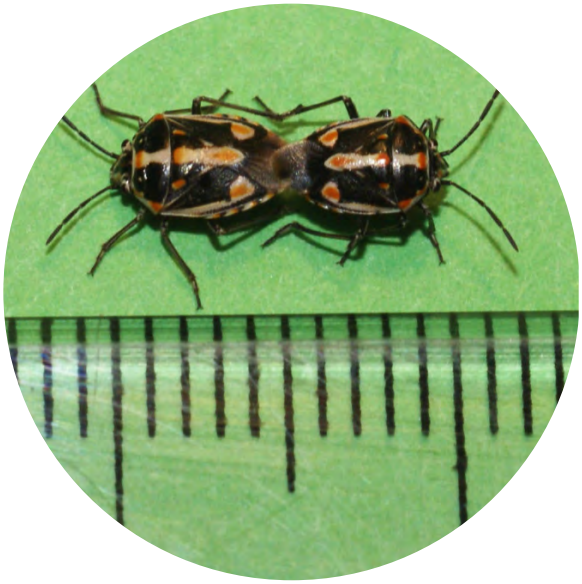

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Bagrada Bug Adults

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Bagrada Bug Nymphs

JOHN PALUMBO

Bagrada Bug Injury (Stippling)

GEORGE HANF

Vitamin D

for Healthy Bones

Sharon Hoelscher Day, M.A.
Former Area Extension Agent, Family & Consumer Sciences
Regional Specialist, Department of Nutritional Sciences
Vanessa A. Farrell, PhD, RD
Associate in Extension, Department of Nutritional Sciences

What is vitamin D?

Vitamin D is a nutrient required for good bone health. Vitamin D helps the body absorb calcium and keep normal calcium levels in the blood.

Children and adults need vitamin D to keep bones strong and healthy. When people do not get enough vitamin D, they can lose bone and become at risk for breaking bones. This condition is called osteoporosis.

Two other conditions, different from osteoporosis, caused by a severe shortage of vitamin D in the body can make bones very soft. These conditions are called osteomalacia in adults and rickets in children.

Some research shows that not getting enough vitamin D may be linked to illnesses such as some cancers, diabetes, and heart disease.

Recommended Intakes for Vitamin D

Life stage	Recommended Dietary Allowance IU/day
Birth to 12 months	400
1 – 70 years old	600
>70 years old	800
Pregnant and Breastfeeding women	600

International Units=IU
Source: National Academy of Science (2010)

Upper Intake Levels for Vitamin D

Life stage	Upper Intake level (IU/day)
Birth to 6 months	1000
6 to 12 months	1500
1 – 3 years	2500
4 – 8 years	3000
All other groups	4000
International Units=IU Source: National Academy of Science (2010)	

How much vitamin D do you need?

The amount of vitamin D people need changes with their age.

Too much vitamin D can lead to health problems. This table shows the guidelines for the Upper Intake Levels for Vitamin D.

Where can you get vitamin D?

You can get vitamin D three ways:

1) Exposure of skin to sunlight

Your body makes vitamin D when your skin is exposed to the sun. Most people meet their vitamin D needs by getting 10-15 minutes of sun exposure on their face and arms for two or three days a week. The amount of vitamin D your body makes due to sun exposure depends on the time of day, time of year, and where you live. Less vitamin D is made in winter and the farther north of the equator you live.

Low vitamin D levels are linked with low sun exposure: people who stay indoors, have dark skin tones, cover their skin, use sunscreen, and fully breastfed infants past 6 month. Older adults (50+ years), cannot make as much vitamin D as younger people.

2) Food and Beverages

There are very few foods that have vitamin D.

3) Pills

If you do not get enough vitamin D from the foods you eat or are not in sun you may need to take a vitamin D pill.

Vitamin D pills come in two forms, vitamin D2 and vitamin D3. Both work well for bone health. As with any pill, ask your doctor before you start taking any new pills.

If you think you are at risk for low vitamin D, ask your doctor if you should have your vitamin D levels checked.

Food Sources of Vitamin D

Food	Vitamin D (IU)
Egg yolk, cooked, 1 large	41
Cereal, fortified, ¾ - 1 cup	40 or more
Liver, beef, cooked, 3.5 ounces	49
Orange juice, fortified with vitamin D, 1 cup	137
Milk, nonfat, reduced fat, and whole, fortified, 1 cup	115-124
Tuna fish, canned in water, 3 ounces	154
Sardine, canned in oil, 3.5 ounces	332
Salmon (sockeye), cooked, 3 ounces	447
Mackerel, cooked, 3 ounces	388
Source: U.S. Department of Agriculture	

Summary

Getting enough calcium, vitamin D, and exercise will help you have healthy bones.

Sources

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ANDREAS KERMANN

Producing the Best Alfalfa or Grass Hay for Horses

William A. Schurg, Ph.D.,
Professor and Cooperative Extension Equine Specialist, Animal Science Department, University of Arizona

Horse owners today are a more sophisticated group. They have more information at their disposal and demand the highest quality forage available. The purpose of this article is to address what type of alfalfa and grass hay is currently desired by equine enthusiasts and what concerns they have regarding quality, availability and costs. While most horse people are recreational users, they have become more aware of physical and chemical evaluation of their hays, and as such would like to know that costs/unit of nutrient supplied meets or exceeds the expectations. Further, in recent months, the fear of not being able to purchase hay even at a price has become one of their greatest fears. In Arizona we have seen retail prices of typical 3 wire bales of alfalfa and Bermuda grass rise from $14 to $20/bale. Further, in the last 10 years we have seen a shift in type of hay demand by horse owners from alfalfa based programs to feeding significantly higher levels of Bermuda grass hay. Local retailers indicate that this shift has increased their need to supply Bermuda grass at a rate of about 2 to 1 over alfalfa. Further, for the first time in nearly 30 years alfalfa hay costs/bale in Arizona has risen over what Bermuda grass/ bale is.

Horse owners are now concerned about availability of hay (any hay at any price) and what alternatives are available; higher nitrogen content of alfalfa; extreme Ca:P ratios, enteroliths (stones in the gut) and blister beetles to name a few. Horse owners want fine stem and textured hay; green color; aromatic smell; good leaf/stem ratio and product that is free of dust, dirt, mold, weeds and other foreign materials. They want hay that has a minimum of 8% Crude Protein for grass and 15% Crude Protein for alfalfa. Their preference is for hay with fiber characteristics: Acid detergent fiber (ADF) at 28 to 35% and Neutral detergent fiber (NDF) at 38 to 50%. Additionally, many owners want to know non-structural carbohydrate values. Horse owners demand excellent quality and are putting more pressure on the retailers, brokers and growers. The concerns with supply and demand make horse owners very nervous as they hear about both the dairy industry and exportation markets competing for hay availability. Also, they are aware of environmental impacts such as droughts, higher costs of production, transportation and recent reports of less hay being grown as farmers are turning to more profitable cotton and corn crops. In Arizona it is estimated that over 300,000 acres were in hay production in 2010, but then hay production acres fell in 2011 to 250,000 acres. All are factors impacting costs and market availability.

Ultimately, as an equine nutritionist the importance of feeding horses adequate amounts of high quality forage is critical. Roughage should be the basic component of all equine diets. It is generally important that good quality roughage is fed at no less than 1% of body weight daily, however most equine diets include 50 to 100% forage. Many nutritionists like to achieve maintenance requirements from hay and realize that young growing horses, gestation and lactation in mares as well as performance horses are likely to need various supplementations above maintenance to meet daily requirements. Table 1 shows typical nutrient requirements for various classes of horses, 1100 pound mature weight.

Recent statistics from the United States Department of Agriculture and the Arizona Statistics organizations indicate that more than 28 million tons of alfalfa is being grown in western states with Arizona hay producers contributing 2.2 million tons of this alfalfa. Other hays grown in our state contributed in excess of 180 tons of annual production. Considering that the average Arizona horse consumes about 3.5 tons of hay annually, horse owner hay usage contributes more than 30% of the total hay produced in our state. This trend is similar in other western states where dry hay fed is the rule rather than the exception.

The nutritional content of hay varies significantly depending upon plant species. Typically there are three types of hays normally found in Arizona and are classified as legume (Alfalfa), grass (Bermuda grass) and cereal (Oat). Some growers are creating mixed blends of hays which usually are Alfalfa/Bermuda grass. The nutrient composition of these hays will generally be somewhat similar in energy content, but protein, mineral and vitamin contents can vary depending on species of plant and the manner which the hay has been harvested. See Table 2, Nutrient Composition of Arizona Hays.

Table 1: Nutrient Requirements of Horses (1100 pound mature)

Class	Crude Protein (g)	Digestible Energy (Mcal/day)	Calcium (g)	Phosphorus (g)
Maintenance	630	16.65	20	14
Growing (12 mo)	846	18.8	38	21
Lactation	1535	31.73	59	38
Intense Work	1004	34.48	40	29
(From NRC, 2007)				

Table 2: Nutrient Composition of Arizona Hays

Hay Type	Crude Protein (%)	Digestible Energy (Mcal/lb)	Calcium (%)	Phosphorus (%)
Alfalfa	16+/-2.5 (13-19.5)	1.04+/-0.06 (0.94-1.16)	1.34+/-0.09 (1.1-1.8)	0.2+/-0.07 (0.18-0.26)
Bermuda grass	10.9+/-3.2 (6-16)	.89+/-0.7 (0.79-1.0)	0.41+/-0.16 (0.2-0.68)	0.19+/-0.04 (0.14-0.28)
Oat Hay	(6-10)	.87	0.35-0.5	0.1-0.3
ADF% of Alfalfa was 32 (range of 31-46); Grass 32 (range of 28-38); Oat hay 35 (32-39) NDF% of Alfalfa was 38 (range of 31-46); Grass 54 (range 45-59.7); Oat hay 52 (44-57) RFV for Alfalfa was 143 (range 107-187); Grass 101 (range 83-129); Oat hay 103 (87-122) Data from Arizona Nutritional Management Seminar, 2007.				

So is one type of hay better for the horse and do horse owners have preferences? It generally comes down to personal preference, hay availability and cost of nutrients provided. Current trends in Arizona are horse owners appear to be feeding significantly less Alfalfa hay as compared to Bermuda grass hay. The perception is that grass hay provides their horses with a closer combination of nutrient requirements without some of the adverse concerns of feeding alfalfa as the sole forage while allowing their horses a slower consumption pattern. Many horse owners are trying to create feeding management programs to more closely "mimic" grazing behavior (eating little meals, frequently).

From a nutrient content alfalfa almost always offers more nutrient value per pound than other forages. However in recent years hay producers have listened to Arizona horse people and the composition of Bermuda grass hay has improved. As stated in the previous paragraph many horse owners believe that alfalfa is "too rich" for their horses. Clearly, alfalfa is higher in energy content and protein value as compared to Bermuda grass. Further, alfalfa is higher in calcium and quite similar in phosphorus content as Bermuda grass. For growing horses as well as broodmares alfalfa can be a very desirable hay to include in these classes of horses when fed with an appropriately balanced concentrate supplement. The wide calcium to phosphorus ratio often found in alfalfa does bring concerns to those feeding young growing horses, but with appropriate supplementation this concern can be overcome. The use of alfalfa hay for the broodmare and/or the performance horse may actually be an economic advantage for owners of those classes of horses.

Within the last 5 years in Arizona both blister beetle and enterolith concerns have occurred and horse owners have backed away from alfalfa use. Hay producers need to realize the potential problems associated with both of these alfalfa related syndromes and manage hay fields to ensure hay is free of beetles while helping educate clients. The number of horses afflicted by either of these conditions is relatively small in our state. One observation regarding enteroliths is with the increased drought conditions and changes to water tables this may contribute to development of stones regardless of forage type fed as water mineralization patterns have changed.

The most important factor that determines the nutritional value of any hay is the stage of maturity when harvested. The more mature a plant is, generally relates to a lower nutritional value as fiber components increase. The availability of protein is lower in more mature plants as well as overall digestibility reduced as compared to less mature plants. Horse owners are becoming more educated and aware of fiber statistics and appear to want to know more about Acid detergent fiber (ADF) and Neutral detergent fiber (NDF) percentages. Both fiber measures help indicate forage quality; as they increase, quality decreases. High quality forages tend to have ADF values of 25-35% and NDF values of 35-55% (as-fed). Lower quality hay tends to have ADF % in the 35-45 range while NDF ranges between 55 and 70%. Horse owners want hay with the lowest ADF for a comparable NDF amount resulting in more desirable hay quality. Since about 2/3 of the protein in a plant is contained in the leaves, plants having high leaf to lower stem ratios are desirable and result in elevated percentage of protein. If hay is harvested too dry, leaves may shatter and the loss of leaves during the baling process produces a hay of lower nutritional quality. Texture and touch of hay should be soft and have flexibility rather than dry, course or brittle feel. Lastly, horse owners look for the color of hay. The correlation of green in color generally suggests higher quality and greater carotene content of the precursor of Vitamin A than hays bleached by the sun or brown in color. Studies at the University of Arizona showed that in 60 days of storage (April to June), the carotene content of alfalfa fell by nearly 60%. Owners want to look inside the bale and not just the exterior to aid in making a color determination and then smell the hay and look for any foreign materials. Hay should be aromatic and smell sweet and fresh, no moldy or dusty smell. Further, freedom of insects, weeds, plastic bags etc. are aspects of this physical inspection which most horse owners are practicing. Horse owners at our local retail stores are encouraged to "bring" hay back if it has any problems with it. The horse owner demands high quality today as they pay premium prices for product.

The following items may be important for hay producers, brokers, retailers and horse owners to understand:

A. Alfalfa usage can frequently result in an economic benefit to horse owners. If alfalfa and grass hays are comparable in price a lactating mare would need to be fed about 30% less grain when feeding alfalfa. Monthly grain costs will be lowered even though hay prices are similar, as suggested by Lawrence, 2000.
B. Alfalfa generally is more palatable and horses prefer it over grass hay and horses don't "waste" as much.
C. Horse owners need to recognize the "true" cost of hay. Cost/bale may not provide as much information as Cost/nutrient.
D. All parties need to be more transparent regarding the availability of hay.
E. Keep horse owners in the "loop" as competition between dairy and exportation continues to heat up.
F. Most horse owners today will pay what the market will bear as long as quality isn't compromise.

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Arizona 4-H Celebrates Centennial in 2013

Kirk Astroth, Ph.D., Director, Arizona 4-H Youth Development, University of Arizona, CALS Cooperative Extension

Almost 100 years ago, a small group of 18 boys gathered in a field near Chandler, Arizona under the tutelage of George Peabody, a caring adult member of the community, and they started a 4-H club. From these humble beginnings, the concept of a youth development program founded on the values of strengthening the head, heart, hands and health of each and every member took hold and spread across the state.

Soon, 4-H clubs started cropping up in a number of communities. By 1914, there were 87 4-H members enrolled in Maricopa County who were active in 12 clubs — 7 corn clubs, 3 cotton clubs, and 2 grain sorghum clubs. Pima County got its first 4-H club in 1914, and Victor Ball of San Xavier Boys' Corn Club was the winner of the 1914 Corn Club Contest. By 1915, total enrollment had grown to 318 members in 43 clubs. It was at this time that the first State 4-H Club Agent was hired — Leland Park who was hired on January 1st. Agnes Hunt was hired as Assistant State 4-H Club Agent. Girl's canning clubs were also started this year. Pigs and poultry were added as projects in 1916. Cochise County got its first 4-H club in 1917.

4-H was growing rapidly enough that by 1917, 3 District Club Agents were hired to help administer the 4-H program. In 1917, the first Farm Boys' Encampment was held at the state fair — the first 4-H camp. The program continued to expand throughout the state, and now in 2013 Arizona reaches about one in every 10 young people in the state — approximately 185,000 youth reached by Arizona 4-H. And for the first time, the state owns its very own camp—The Harold & Mitzie James 4-H Camp and Outdoor Learning Center on Mingus Mountain near Prescott.

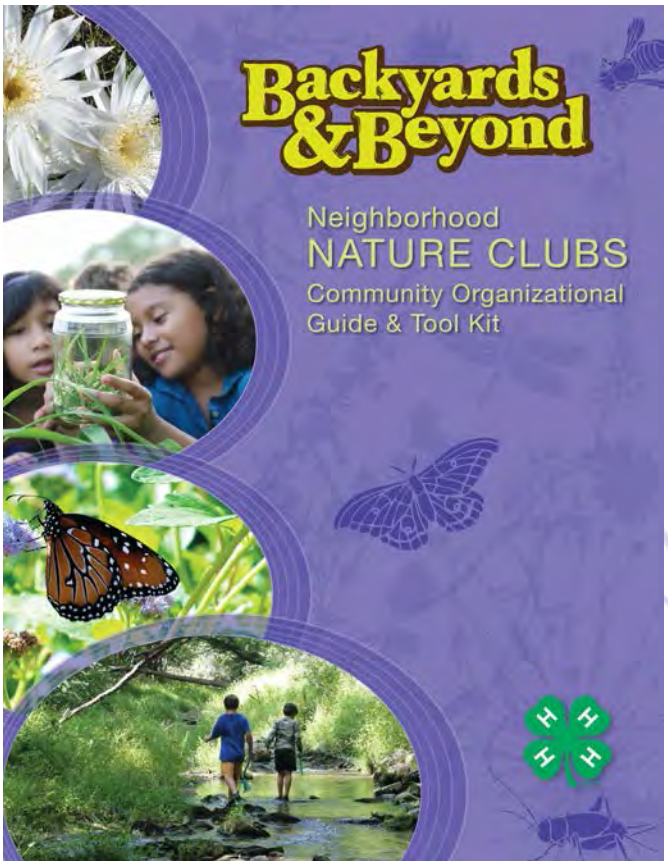
To celebrate these 100 years of growth and progress, Arizona 4-H is planning a wide variety of events, activities and celebrations to mark the anniversary. Each county will have a variety of ways to get involved in marking our 100 year anniversary—from birthday parties, to historic displays to parades. The signature and culminating event will be held on Saturday, October 12, 2013 at the Crowne Plaza San Marcos Golf Resort (http://www.sanmarcosresort.com/) in Chandler—right where it all began 100 years ago. Built in 1912, this luxury hotel is a perfect venue for our centennial gala since it is listed on the National Registry of Historic Places. The gala will provide us opportunities to recognize alumni, supporters, and friends of 4-H along with an inspiring keynote speaker and University of Arizona President Ann Weaver Hart (invited).

The **Arizona 4-H Hall of Fame** has been revived and each county will be able to nominate at least four new inductees who will be honored at a gala event in the fall. Applications are on our special centennial website (https://extension.arizona.edu/4h/centennial). We will also recognize Arizona **Centennial families** with a combined 100 years or more of membership and/or volunteer service in 4-H. Clubs are also encouraged to perform 100 hours of community service to celebrate our anniversary. These clubs will also be recognized at the fall gala. We are challenging everyone—clubs and individuals—to contribute at least $100 to the Arizona 4 H Youth Foundation as a part of the centennial.

As a part of Arizona's Centennial Celebration, we want to hear your 4-H story! Tell us a little about your experiences in 4-H and how they impacted your life. For example, you can upload a favorite photo from your 4-H days and tell us something you remember about the day it was taken! Or tell about a personal triumph you remember, and how you felt when it happened. What was the greatest challenge you mastered in 4-H? What was your favorite project, and what made it special? Did something turn out in a way that you never expected? Who made a difference in your 4-H experience? Which of their actions or statements stand out in your memory? Do you think 4-H changed you as a person? How?

This year will be a unique and exciting year in Arizona 4-H. Plan on getting involved at the local level and let everyone know that 4-H is alive and thriving here in Arizona. Contact your county Extension office for details and ways to get involved, or visit our website.

4-H Takes Explorers Beyond Backyards with New Nature Project



Arizona 4-H is inviting kids and adults to connect with the outdoors right outside their own back doors through a brand new project called Backyards & Beyond. Concerned about an increasing disconnect between youth and the natural world, Arizona 4-H Director Kirk Astroth raised the alarm with 4-H national headquarters about the need to address what one author has called "nature-deficit disorder." In response, USDA awarded Arizona 4-H a three-year grant to develop a curriculum to get kids, families, and neighborhoods exploring the outdoors and working together to reclaim neighborhood green spaces. Astroth recruited Suzanne Dhruv, co-director of the Ironwood Tree Experience, a program of Prescott College in Tucson, to create a curriculum to engage youth and families in exploring the natural environment around them.

Project activities like "Sensory Safari" challenge explorers to go outside and experience the shapes, sounds, textures, scents and even flavors found in nature near their homes. In an activity called "Seasons' Greetings," explorers practice a science called phenology, which focuses on observing seasonal changes. There are also activities that encourage explorers to take part in active play outdoors, to use their creativity in nature, and to observe wildlife and natural resources. But the project is more than just playing outside, said Dhruv. Building on the sense of place that develops from knowing and loving your environment, Backyards & Beyond also leads kids to make a personal commitment to the environment.

The project's activities in environmental education, sustainability practices, natural resource conservation, citizen science, community development and environmental action can lead older teens to real-life opportunities like volunteering, internships, secondary education and even jobs that involve the outdoors, she said. One activity where she's really seen kids thrive is the Environmental Action Plan, said Dhruv. "I feel very confident that kids are able to make a plan and follow through with positive action that improves their local environment," she said, "They just need opportunities."

With help from volunteer nature club leaders, such opportunities may soon be popping up all over. Anyone can start a Neighborhood Nature Club, even if they aren't already involved in 4-H. A step-by-step guide called the Backyards and Beyond Neighborhood Nature Club Community Organization Guide and Tool Kit tells how. Neighborhood Nature Clubs bring together neighbors to share their love of the outdoors and invite young people to explore natural spaces and open places.

Astroth and Dhruv had help from 4-H National Headquarters, U.S. Fish and Wildlife Service, USA-National Phenology Network, Children & Nature Network, and individuals who helped create and review the curriculum. "It's all about making it easy and fun for people to get into the outdoors," said Astroth. "A lifetime connection to the natural world can start right in your own backyard."

To learn more about the curriculum, go to:
neighborhoodnatureclubs.arizona.edu

May 15, 1862
USDA Established

On May 15, 1862, President Abraham Lincoln signed into law an act of Congress establishing the U.S. Department of Agriculture (USDA). President Lincoln called USDA the "People's Department" because he understood the importance of agriculture to the nation.

May 20, 1862
Homestead Act

The Homestead Act provided a process for a citizen to file an application and lay claim to 160 acres of surveyed Government land.

July 2, 1862
Morrill Act
(Land Grant College Act)

The Morrill Act donated public lands to each state for the endowment, support, and maintenance of colleges where the leading object shall be to teach such branches of learning as are related to agriculture and the mechanic arts.

March 2, 1887
Hatch Act

The Hatch Act authorized federal-grant funds to each state that would establish an agricultural experiment station in connection with the land-grant college established under the provisions of the Morrill Act of July 2, 1862.

COOPERATIVE EXTENSION

Historic Milestones

Jeffrey C. Silvertooth, Ph.D. Associate Dean and Director of Economic Development and Extension
and Susan Pater, Cochise County Extension Director and Area Agent, 4-H Youth Development,
College of Agriculture and LIfe SciencesUniversity of Arizona

Last year in 2012, we celebrated the 150th anniversary of the Morrill Act (also known as the "Land-grant College Act") that was signed into law by Abraham Lincoln on 2 July 1862. This single piece of legislation put on track the development of public "land-grant" institutions in every state of the union including the University of Arizona. This year we will celebrate the 100th anniversary of Arizona 4-H and next year we celebrate 100 years of Cooperative Extension. It seems appropriate to reflect on our history, consider where we have come from, and how we have come to be in the form that we see today at the University of Arizona and the College of Agriculture and Life Sciences.

The early 1860's marked a significant period in our nation's history. Not only was the U.S. embroiled in the Civil War, but this period also witnessed the implementation of several important pieces of legislation. The U.S. Congress had been gridlocked since the 1850's due primarily to the political divisions associated with slavery. Before Abraham Lincoln's inauguration on 4 March 1961, seven states had seceded from the Union. Four more seceded after his inauguration, after which Congress began to move.

On 15 May 1862 Abraham Lincoln signed legislation creating a United States Department of Agriculture (USDA). Then on 20 May, Congress passed the Homestead Act which had a huge impact on the settlement of the western lands of the U.S. The Homestead Act provided for the eligibility of a purchase of 160 acres of land for $18 by people living on and farming the land for five years. Any citizen or intended citizen was eligible if they had never taken up arms against the U.S., including female heads of households, and African Americans who became citizens under the 14th Amendment. Unfortunately, the Homestead Act provided one means for the displacement of the Native Americans.

The Morrill Act was passed and signed by President Lincoln on 2 July 1862 providing for the foundation of land-grant universities in every state of the union with the basic purpose of developing public universities in each state to "educate the populace in agriculture, home economics, mechanical arts, and other professions."

The basic foundation and philosophy associated with the formation of the land-grant institutions can be traced back to the thinking of Thomas

August 30, 1890
Second Morrill Act

The second Morrill Act secured additional funding for the land grant colleges and provided additional "separate but equal" land grant institutions for black students. This led to the creation of 17 historically black land-grant colleges.

1913
Arizona 4-H Begins

Boys and girls club work (now called 4-H youth development) had its beginning in 1913, when Mr. George P. Peabody organized a boys cotton club in Chandler.

May 8, 1914
Smith Lever Act

The Smith-Lever Act provided federal support for land-grant institutions to offer educational programs to enhance the application of useful and practical information beyond their campuses through cooperative extension efforts with states and local communities.

September 28, 1994
Improving America's Schools Act

Land-grant status was conferred on 29 Native American colleges in 1994 as a provision of the Elementary and Secondary Education Reauthorization Act. In Arizona land grant status was awarded to Diné College in Tsaile and Tohono O'odham Community College in Sells.

Jefferson in the very early years of the 19th century that were perhaps best developed in his writings on the "General Diffusion of Knowledge." In these writings he pointed to the need of a progressive republic to have a well-educated voting population. In the early 1800's higher education was available only to the very wealthy class of citizens. Thus, Jefferson saw the need for public institutions to provide an affordable college education to the general population. He also called for the need of these public institutions to "bring science to bear on practical problems."

With the implementation of the Morrill Act in 1862, we can see the connection to Jefferson's ideas and the root of the public institutions, such as the UA that we have today. The more complete development of the land-grant model took place with the signing of the Hatch Act in 1887 that provided for the formation of the Agricultural Experiment Stations associated with each land-grant institution. This was followed by the completion of the Smith-Lever Act of 1914 that established a system of Cooperative Extension services associated with each of the land-grant universities.

The land-grant institution model is still entirely relevant to modern American society in the 21st century, consistent with the early visions of Thomas Jefferson. We still need a well-educated populace and the 21st century problems certainly require the application of good science and technology. The land-grant model we have today with the capacity of directing strong degree programs (Academic Programs), the development of robust research programs (Agricultural Experiment Station), and the bridging and engagement with the university and the public (Extension system) are absolutely critical features in this type of public institution. This is a university model that is envied in many parts of the world and it should be worthy of the public and our efforts to strengthen and build organizations such as the College of Agriculture and Life Sciences for the future needs of our society.

Cooperative Extension represents a unique three way partnership of the United States Department of Agriculture, the University of Arizona and Counties to provide local citizens' access to the Land Grant University System. Our roots in communities help us understand local needs and put university expertise and connections where they can make a difference – improving lives, communities and economies.

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Cooperative Extension in the 21st Century

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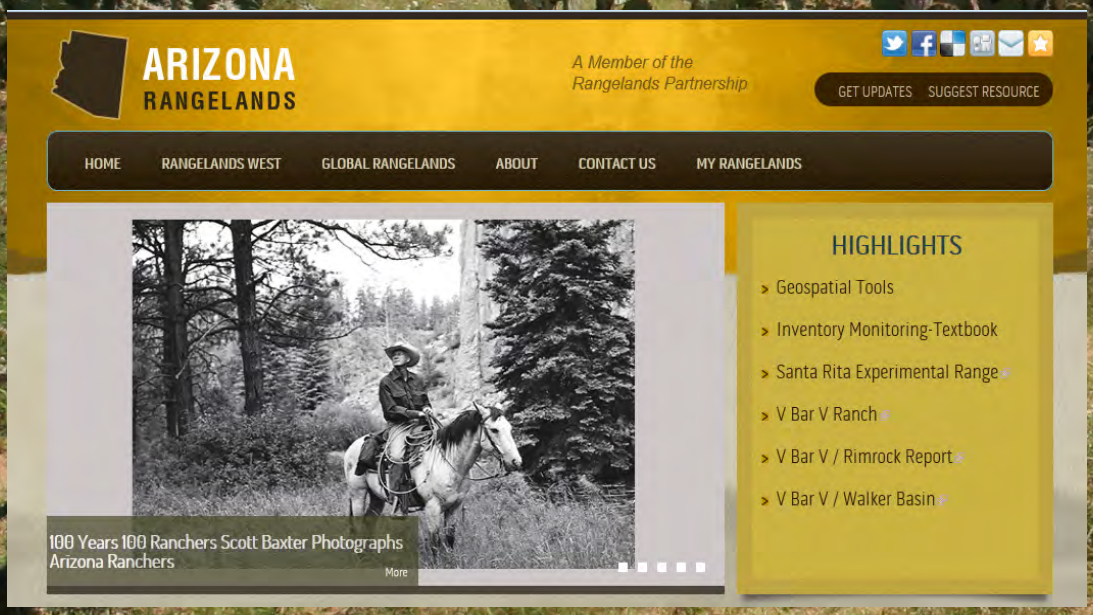
The Rangelands Partnership Launches Websites Promoting Sustainable Rangeland Management

The Rangelands Partnership, a university-based, multi-disciplinary collaboration, has launched a suite of websites with a database of more than 13,000 resources, the purpose of which is to support research, sustainable management, and education about the world's rangelands.

Rangelands cover 70 percent of the world's land area and 66 percent of the U.S. They include grasslands, savannas, shrublands and deserts. Rangelands are important resources for wildlife habitat, watersheds, recreation and forage for livestock production and, therefore, are critical to economic development in rural communities and to people everywhere for access to natural resources and open space.

"The spark to create a web-based portal for rangeland resources was supplied by the Agriculture Network Information Center (AgNIC), an initiative coordinated by USDA's National Agricultural Library," says Jeanne Pfander, associate librarian at the University of Arizona (UA) and current Chair of the Rangelands Partnership. "The UA AgNIC team brought together Cooperative Extension rangeland specialists and rangeland scientists, librarians and IT specialists in 1996 to develop an Arizona Rangelands website. The astonishing aspect of this unique interdisciplinary collaboration is how quickly the idea and model spread beyond Arizona."

In 2002, the Arizona Rangelands project expanded to become what is now known as the Rangelands Partnership – a collaboration of 19 western



U.S. land-grant institutions and several international organizations which have been working to develop evaluated, science-based information resources and tools now available in the following websites.

Global Rangelands is the home website, useful for gaining an international perspective on rangeland themes and searching the database which contains full-text articles, reports, videos, learning tools and key websites.

Rangelands West provides access to the global database as well as specific "Hot Topics" with a focus on Western U.S. rangelands. It also includes sections on "Recruitment & Careers" and "Range Educational Resources" that are being developed by the Range Science and Education Council.

From the *Rangelands West* home page, users can link to state sites developed by multidisciplinary teams serving local constituency information needs. An example is the *Arizona Rangelands* website which provides access to extensive resources and videos on vegetation monitoring, a critical tool for making management decisions based on data collected over time.

"These websites have organized, comprehensive information on all aspects of rangelands, much of it not previously easily available to practitioners or the public, especially those living in remote locations," says George Ruyle, Marley Endowed Chair for Sustainable Rangelands Stewardship in the UA's College of Agriculture and Life Sciences' (CALS) School of Natural Resources and the Environment.

Barbara Hutchinson, director of the Global Rangelands Program as well as the UA CALS Communications and Technologies department adds "Providing a broad range of information about rangelands is hugely important. We are taking scientific information to rangeland communities so that they can be more economically viable while retaining open spaces."

For more information, contact Barbara Hutchinson at (520) 626-0329; Director, UA CALS Communications and Technologies, and Director, Global Rangelands Program or Jeanne Pfander at (520) 621-6375; Associate Librarian, University Libraries, UA, and Chair, Rangelands Partnership, or Sheila Merrigan (520) 626-6543; Coordinator, Information Technology, UA CALS Cooperative Extension.

Web URLS: http://globalrangelands.org;
http://rangelandswest.org;
http://globalrangelands.org/arizona

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