

close to the ground just prior to treatment. The sooner the herbicide is applied, the more effective the treatment will be. On small stems or on plants that have been cut previously and subsequently resprouted, the bark may be frayed to expose more phloem and potentially increase herbicide uptake. The frayed area should be treated as well as the cut surfaces. Most labels recommend application of the herbicide within five minutes after cutting.

When treating a small number of stumps, the herbicide can be applied with a small, inexpensive paint brush. Pour the necessary amount of herbicide into a disposable plastic cup to prevent sawdust and dirt from contaminating the herbicide in the original container. Triple rinse the paint brush and plastic cup and discard when finished. Applying the herbicide from a plastic spray bottle may be more suitable in situations where multiple treatments are necessary over an extended period. Set the spray bottle to deliver a stream rather than a mist and clearly label the bottle "Herbicide – Do Not Reuse". Test-spray plain water from the bottle to ensure proper function and familiarize yourself with the spray pattern. Completely empty water from the spray bottle and add herbicide when you are ready to begin making applications. Pour the unused herbicide back into its original container when finished. Triple rinse the bottle, spray water to clean the pump then, render the spray bottle unusable (i.e. puncture bottle and cut the pump intake tube) and discard. When working with pesticides, always wear long-sleeve shirt, long pants, closed toe shoes, safety glasses, appropriate gloves, and other recommended personal protective equipment as per product label instructions.

Plant susceptibility depends on a number of factors: time of year; stage of plant growth; type of application; soil moisture before, during, and after application; precipitation (rain or snow); and temperatures of soil and air before, at and immediately after the application. In general, fall applications are most effective because plants are translocating carbohydrates and proteins to their root systems. Herbicide active ingredients are more readily translocated at this time.

Many woody plants are directly connected to neighboring plants of the same species and herbicide treatments can potentially be translocated to other individuals sharing that common root system. Suckers produced by roots of an adjacent tree are an example of a shared root system. Cutting and treating these sprouts with an herbicide can result in translocation of the active ingredient to the common root system and may ultimately kill non-target trees. In some cases, trees of the same species growing in a given area may have a common root system as a result of root grafting. Never use herbicides to treat sprouts coming off a root system of a tree that you want to keep or on plants that may be sharing a common root system. Sucker producing tree species include: tree of heaven, honey locust, black locust, hackberry, western soapberry, cottonwood, aspen, poplar, willow, box elder, and others.

Always read and follow herbicide label directions carefully. This bulletin suggests ways to avoid problems, but does not supersede product label instructions or cover first aid, or storage and disposal requirements. The herbicide label lists hazards that may make it unsuitable for use in certain situations.

Sustainability— Understanding and Putting It Into Practice

Hardly a week goes by without hearing the words sustainability, sustainable or sustainable development put into use somewhere or somehow. It's no coincidence that the words are often used to describe our lifestyles, future and children's future. This article describes the origins of "sustainability" and the areas of our lives where we can put the word into practice.

First, let's take a look at a basic understanding of the word's meaning and a little history into its emergence. The adjective "sustainable" means: "a: of, relating to, or being a method of harvesting or using a resource so that the resource is not depleted or permanently damaged, b: of or relating to a lifestyle involving the use of sustainable methods." (Merriam-Webster's On-line Dictionary)

In 1987, the United Nations' World Commission on Environment and Development issued a report titled Our Common Future also known as The Brundtland Report, named for the Commission's chairwoman, Madame Gro Harlem Brundtland, who was the Prime Minister of Norway between the years 1981-1996. This report defined sustainable development as:



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“Development that meets the needs of the present without compromising the ability of future generations to meet their own needs.”
(Brundtland, 1987)

In 1991, three environmental organizations, the International Union for Conservation of Nature and Natural Resources (IUCN), the United Nations Environment Programme (UNEP) and the World Wide Fund for Nature (now the World Wildlife Fund), and the author David Munro, jointly published a book called *Caring for the Earth*. This book contributed substantively to the concept of sustainable development by offering some very basic principles and ideas. Underlying these principles is the following premise:

“We need development that is both people-centered, concentrating on improving the human condition, and conservation-based, maintaining the variety and productivity of nature. We have to stop talking about conservation and development as if they were in opposition, and recognize that they are essential parts of one indispensable process.” (IUCN et al., 1991)

The National Network of Sustainable Living Educators (NNSLE), made up of university Extension agents and other sustainability professionals from across the country recently released a white paper titled *A Vision for Relevance* (Crosby et al., 2008). This paper describes the imperative for individuals and communities to be engaged in the issue of sustainability.

The NNSLE defines three critical components of sustainability—economic, social and environmental. *Economic* sustainability is defined as maintaining or increasing our standard of living without decreasing the standard of living of others. *Social* sustainability implies equity and fairness in the creation of vibrant community life, both locally and globally. And lastly, *environmental* sustainability mandates conserving and managing our ecosystems for future generations. Any sustainability solution must consider all three of these components. If not, then that solution is bound to have a negative impact on the one component that is overlooked.

So what are the areas of our lives where sustainability matters? As we consider the economic, social and environmental components of sustainability, then land use, construction, energy, food, consumerism, health, economic development, employment and education are all areas needing to be addressed either through individual choices or community initiatives.

Rural residents tend to lean towards rugged individualism. Self-sufficiency can easily be equated with sustainability, where growing your own food, raising your own poultry and livestock, and harvesting rainwater are all measures that conserve resources. These practices are not necessarily innovative or new, but have actually been around for thousands of years.

Today, the creed of self-sufficiency has plenty of room to expand into modern concepts of sustainability that further decrease our dependency on finite resources. For example, “living off the grid” in contemporary terms no longer means relying on fossil fuels to power generators. Instead, renewable resources such as solar technology and wind turbines are becoming more affordable and provide a new pathway to sustainability in the rural areas. The same holds true for the potential of second generation cellulosic biomass fuels as a substitute for gas and diesel-powered machinery (Huber and Dale, 2009).

In those rural areas where residents already have access to the grid, solar technology and wind turbines are still viable, renewable energy sources that not only reduce an individual’s consumption of fossil fuel based energy, but can also potentially contribute to the grid, through net-metering. Utility companies in Arizona are now offering rebates to individual consumers for certified solar installations. These along with net metering agreements with utility companies can go a long way to recovering the cost of the installation. In addition, thirty percent of residential solar installation costs can be deducted directly from income taxes owed to the federal government, since Congress extended the Solar Investment Tax Credit in 2008.

Farmers markets are an integral part of the urban/farm linkage and have continued to rise in popularity, mostly due to the growing consumer interest in obtaining fresh products directly from the farm. Farmers markets allow consumers to have access to locally grown,

farm fresh produce, enables farmers the opportunity to develop a personal relationship with their customers, and cultivate consumer loyalty with the farmers who grows the produce.

Local farmers' markets can also be a vehicle to enhance the sustainability of rural areas. Farmers' markets return a higher percentage of our food expenditures to the local economy than buying from retail outlets that source abroad. Decreasing the distance that our food travels can reduce greenhouse gases generated from fossil-fuel driven transportation. Communities benefit from an abundance of fresh and nutritious fruits and vegetables which promote healthy individuals and keeps health care costs down. Arizona residents can locate farmers' markets, agri-tourism events, and other producers that sell directly to consumers by going to www.farmdirectory.org. This resource, developed by the University of Arizona's Department of Agricultural and Resource Economics, can display the local produce available by week of the year for a maximum distance from a specified zip code.

places that rural residents drop off their normal garbage. The Arizona Department of Environmental Quality has a website (www.azrecycles.gov) that allows anyone to find the closest recycling facility to them by just plugging in their zip code.

It's easy to feel overwhelmed by the continuous stream of information and media coverage about environmental degradation, depletion of natural resources like water and agricultural lands, the effects of climate change including drought and invasive species, and the very tangible outcomes of global economic crises. One could be led to believe that there is very little that any one individual or small rural community could do to make a difference or stem the tide of negative impacts. Yet, understanding and acting upon the concept of sustainability as individuals and communities is a major step forward. As illustrated in this article, there are numerous ways in which we all can make a difference—for the sake of the planet and those following in our footsteps.



Producers that choose natural or organic agricultural practices are reducing the amount of energy inputs associated with chemical pesticides and fertilizers. Appropriately managed range and farmlands are a sustainable asset to our watersheds by conserving soils, enhancing wildlife habitat and providing open space and recreational areas. Agricultural tourism is an excellent example of the convergence of the economic, social and environmental components of sustainability.

In the arid Southwest, water has always been a precious resource and our growing population has heightened the scarcity of this resource. The certainty and frequency of drought in the Southwest make it even more important for us to use our water resources in a more sustainable fashion. Arizona Cooperative Extension has a multitude of informational resources on reducing our water consumption—through low-flow appliances, drought-tolerant landscaping, rainwater harvesting and simple practices in the home and garden (www.ag.arizona.edu/extension/water).

Many have heard the popular mantra of “reduce, reuse and recycle.” This description of the waste hierarchy has been a powerful tool for many years to raise our collective conscious about the trash we produce. It serves us well, too, as an apt slogan for sustainability. Although recycling facilities may be located a good distance away in rural areas, many counties and communities are now providing recycling drop-off containers for aluminum and tin cans, office paper, cardboard, newspaper and #1, #2 and #3 plastics, tires, hazardous waste, and batteries at various locations and sometimes at the same

Sources of Information:

- www.ag.arizona.edu/extension/water
- www.azrecycles.gov
- www.farmdirectory.org
- www.usda.gov/oce/sustainable/
- www.sustainable.org

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