GIANT HESPERALOE

An interesting and potential crop for Yuma County producers could be found in Giant Hesperaloe (*Hesperaloe funifera*), a slow growing, 6 foot tall stemless plant found in the Yucca family and desert plants native to northern Mexico. Hesperaloe has stiff, broad, lime green leaves with coarse white fibers along the margins which has shown to have potential use for paper making.

Most papermakers in the United States, Canada, and Europe use trees as their source of fibers. In the pulping process, the wood is broken down, either chemically or mechanically, into individual fiber cells that are then suspended in a liquid slurry and formed into sheets on high-speed papermaking machines.

Evergreen conifers (softwoods), such as pine, spruce, and Douglas fir, produce comparatively long fiber cells that form strong paper. Broad-leaved trees (hardwoods), like poplar and aspen, have shorter, broader cells that produce a smoother paper with less strength. Many papers, such as newsprint, are a mixture of softwood and hardwood pulps. Because the stronger softwood pulps command a higher price than hard-wood pulps, papermakers blend these pulps to optimize paper quality while minimizing their use of higher cost fibers.

The greatest market opportunity for *Hesperaloe* fibers may be as a blend for strengthening various grades of paper, such as recycled paper. Fiber cells lose considerable strength in the making of recycled paper and some amount of virgin fiber, usually softwood, must be added to recycled fibers to provide strength. Using a nonwood fiber, such as *Hesperaloe*, in recycled papers could be an attractive feature to consumers.

The University of Arizona has been working with several companies in the pulp and paper industry to develop two species of *Hesperaloe* as a new source of fibers for papermaking. The project is about to move from the exploratory research and development stage toward full-scale commercialization. The effort has included studies of irrigation management practices, stand establishment methods, planting dates, mechanical and chemical weed control, nitrogen fertilization and mechanical harvesting.

The fiber cells of the *Hesperaloe* are unusually long and thin and are very comparable to the softwood fibers. However, they produce paper with much higher strength.

The James River Paper Corporation has investigated using *Hesperaloe* fibers in several types of paper. *Hesperaloe* papers have superior strength and are as good as those made from high-cost, specialty pulps.

The compact growth habits of *Hesperaloe* suggest that the plant could be grown at a high stand densities. These perennial plants are very water-efficient, and their leaves are spineless and thornless, which facilitates handling. All these traits suggest that *Hesperaloe* species might do well under irrigated production in the arid southwestern desert regions, including Yuma.

In addition to its possible use in specialty papers, *Hesperaloe* could also potentially replace some softwood uses. For instance, in some applications, half as much wood pulp can be used when substituted with *Hesperaloe* pulp. And *Hesperaloe* can be produced for less than twice the average price of softwood pulp since softwood pulp prices vary greatly in 3- to 5-year cycles.
This potential for substituting *Hesperaloe* pulp for softwood pulp would greatly expand its market opportunities beyond that of the premium specialty papers. Additional markets would be necessary to justify the development of a new fiber crop, given the small size of the specialty papers market.

Many plants related to *Hesperaloe* are economically important. All related plants contain steroidal sapogenins, and some have been used in folk medicine, and locally and commercially as soap. They also provide fibers for cordage, baskets, and hats, as well as food and drink for many Native Americans in the southwestern United States. In the southern United States, some species in each genus are cultivated and represented in many home landscapes.

Like many desert plants, *Hesperaloe* basically shuts down during the day and grows mainly at night, so it requires little water.

*Hesperaloe* fibers could also act as the reinforcing material in composites used for products such as building panels, car doors and bicycle frames.

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