

Jim Arnold

He Found Science Interesting, Then Built a Career



Jim Arnold (left), now with the Laramie County Conservation District in southeastern Wyoming, discusses with ARS soil scientist and former mentor Gerald Schuman the use of trees instead of wooden fences to trap drifting snow. Photo by Scott Bauer. (K7383-8)

When was the last time you called a radio or television station or wrote to a newspaper to let them know you didn't agree with an issue or viewpoint? Don't feel too bad. If you're like most people, you're content to let someone else "set the record straight."

Jim Arnold is not in that majority group. He felt strongly enough about a radio commentary to call and complain. He let the station owner know that he didn't appreciate how federal employees were being stereotyped as having cushy positions with no fear of being fired.

He invited the station owner to visit the Agricultural Research Service's High Plains Grasslands Research Station near Cheyenne, Wyoming. Arnold had only been working part time for a few months, but he had already become aware of the importance of his fellow workers' research and the diligence they possessed. Arnold says he still feels that way 20 years later.

"The federal government is responsible for many things, including stewardship of our natural resources," says Arnold, who is now with the Laramie County Conservation District in southeastern Wyoming.

And he's versed on the subject. Arnold grew up on a ranch that adjoins the research station, so he had some idea of what the employees were doing. When he was a freshman at Laramie County Community College, he started working with

ARS soil scientist Gerald E. Schuman to find ways to reclaim lands that had been disturbed by strip mining.

One of the issues then confronting the soda ash mining industry was the caustic nature of processing wastes. When sodium products are refined from the mineral, waste tailings that have a very high sodium content and salinity level are produced.

While sodium bicarbonate, or baking soda, can be manufactured, companies prefer this natural soda ash source. After some processing, it

SCOTT BAUER



Jim Arnold readies evergreen seedlings for planting in this snow fence replacement project. (K7382-3)

becomes the familiar product we keep in our refrigerators to control odors or in cupboards for use in many baked goods. Wyoming produces more than 90 percent of the nation's soda ash.

"The work was so interesting that I realized it was what I wanted as my career. I continued working at the research station during the summers while earning my undergraduate

degree in soil and agriculture from the University of Wyoming in Laramie," says Arnold.

He later obtained a master's degree in soil science and agronomy at the university with funds provided by ARS under a cooperative agreement. All the while, he was working on ways to get grasses and shrubs to grow on disturbed lands.

"The high sodium and salinity of the soda ash tailings make revegetation difficult, for they can migrate upward into topsoil that is placed over the tailings to promote revegetation," says Schuman.

Arnold's research evaluated the effectiveness of various gravel and bentonite clay barriers in preventing the upward movement of sodium and salinity into topsoil. The research was accomplished in large plastic cylinders—6 inches across by 6 feet tall—that were filled with soda ash tailings, then the barrier material, and finally the soil on top. The cylinders were equipped with ceramic tubes placed through holes at various depths. These collected water samples and assessed the movement of sodium and salts.

"I found that a mixture of 10 percent bentonite clay with 90 percent soda ash spoil, overlain with a gravel barrier beneath a topsoil layer, is best. It enables adequate water movement into the reconstructed soil-tailings system and also prevents the upward migration of the salts into topsoil," says Arnold.

This work was the basis for fulfilling his master's degree research requirement.

Arnold's interest in improving and protecting our natural resources continues. He is now a tree specialist who designs and plants trees to become living snow fences, trapping drifting snow in fields rather than across roads and highways. Trees are

cheaper and much more aesthetic than wooden fences, and they provide bird and wildlife habitat.

"Originally, research and plans for establishing shelter-belt plantings on the Great Plains were developed by ARS scientists at Cheyenne; Mandan, North Dakota; and Woodward, Oklahoma," says Schuman.

"Earlier research showed that tillage was necessary to keep the area around the trees free of grass and weeds. This reduced competition for the scarce precipitation the area receives but was labor intensive and costly," he says.

Arnold and others developed and tested ways to place plastic fiber barriers over tilled areas destined for tree rows.

"The plastic fiber barriers keep weed seeds from germinating and grasses from growing, and they hold soil moisture in that ordinarily would be lost to evaporation," says Arnold.

He helped establish two living snow fences on the station. They contain Rocky Mountain Juniper and green ash trees. Each planting is composed of three or four rows. They are now 3 years old and about 3 to 5 feet tall. Other living snow fences in the area are older and taller. This system greatly increases the trees' rate of growth, compared to the old tillage method.

"Arnold often visits the station and consults with the staff about tree and shrub establishment," says Schuman. They have a cooperative agreement that allows Arnold to conduct research and store young tree seedlings in the root cellars until weather becomes favorable for planting in April and May.—By **Dennis Senft**, ARS. ♦