

Herb and Pat Bartel Marion County

Resource Conserving Crop Rotation

Integral to the restoration of soil health (and indirectly to water quality) for the Bartels was the establishment of a sustainable crop rotation system.



When asked what he has learned through his Clean Water Farms demonstration project, Herb Bartel replies, "We need to be teaching people a land ethic instead of just promoting conservation practices." With that statement, his philosophy of "ag land restoration" begins to unfold. Although water quality is not the primary farm goal, it is a natural result of the work that Herb is pursuing in order to restore health to his farmland.

Located northeast of Hillsboro in Marion County, the Bartel farm adjoins public land surrounding Marion Reservoir. Excessive levels of nutrients and bacteria are a concern in Marion Reservoir. Atrazine, a

common herbicide, has also been detected. In 1996, the Bartels joined the Clean Water Farms project with a multi-faceted plan for their farm. As Herb stated in his application, "Agriculture is the proper land use to maintain water quality for Marion Reservoir, and our farm can be the model to demonstrate this."

In the spring of 1996, an abandoned well was plugged to prevent direct access for contaminants into the groundwater. Gypsum was applied to several small areas where oil field brine had rendered the soil non-functional. Twenty-four tons of gypsum were hauled from Oklahoma to achieve the desired effect. Herb's comment - "Oh, boy. That works!"

Cooperator:

Herb and Pat Bartel
Rt. 2 Box 280
Hillsboro, Ks. 67063

Watershed:

French Creek, North
Cottonwood River

Water Quality Concerns:

Soil and chemical run-off
of cropland which drains
into Marion Reservoir

Demonstration:

- * Implement a strict crop rotation aimed at reducing fertilizer and chemical use
- * Repair gullies to function as filter strips and wetlands

Work also began that spring to repair gullies that had formed in the prairie north of the farmstead. Herb used a backhoe to deepen a natural pool within the gully to create a wetland. Organic matter, in the form of hay, branches, even whole trees, was pushed into the eroding gullies to trap sediment and slow the water. As native plants began to populate the wetland and the decomposing matter in the gullies, they began to do their work as filters for any water moving through the drainage area.

Herb also began restoration work on two acres of cultivated land taken out of production. The Bartels purchased native forb plants from the Dyck Arboretum in Hesston. These, along with gamagrass seed harvested from an adjacent native pasture, were seeded into the two acre parcel.

The brome waterway bisecting the home place was converted to a filter strip planted to native species. Eastern gamagrass, Maximillian sunflower, and Illinois bundleflower were seeded during the fall and winter of 1996.

Perhaps most integral to the restoration of soil health and water quality across the farm was the establishment of a sustainable crop rotation system using cover crops to fix nitrogen and improve soil quality. Green manure crops of alfalfa, winter peas, sweet clover, and cowpeas are cut with a sickle bar mower so they are spread evenly over the ground and allowed to decompose rather than being removed as hay or forage. Cash grain crops are soy-



Gullies were cutting gashes across the Bartel farm where water entered via culverts from under a county road. Herb began filling gullies with organic matter to trap sediment and slow the water. It's a low-tech approach to the problem, but it is one that is slowly making a difference. KBS, who monitored water quality on Herb's farm, found that the artificial wetlands created in these spots acted as filters for water quality. See Appendix for more.

beans and wheat.

Herb uses lime to raise the soil pH explaining, "We achieve better availability of the natural nutrients by increasing the pH of the soil." Rock phosphate replenishes the phosphorus levels where they are low. "It keeps the microorganisms working continuously, unlike super phosphate fertilizer applications."

Wheat following second-year alfalfa in this system has yielded 80 bushels per acre. Wheat following sweet clover produced 60 bushel wheat with 13.3 percent protein. Soybeans seem to be more difficult in this part of the state with moisture being the most commonly limiting factor. The 2000 crop yield was low because of a particularly severe drought in the area.

Brome grass is hayed and used as compost throughout the farm. Herb composts the large round bales "in place" by unrolling the bale wherever the soil especially needs help. Gullies, washes, and areas with too little organic matter all benefit by the decomposition of large amounts of vegetative matter.

Herb plants a "community of native shrubs" at every spot where water leaves the farm. A favorite is rough-leaved dogwood. The shrubs slow water movement and digest contaminants in the runoff water.

"The biggest problem is that it is not one quick season's transition from chemical dependency to natural fertility that can produce a decent crop. Also, it can be difficult to buy the things you need, such as rock phosphate, from traditional agricultural suppliers."

But the result of all these efforts

is the creation of a farm where healthy soil supports a diversity of living things. Soil is held in place by plants and decaying vegetation. Water movement through the drainage areas is slowed by vegetation so it can be absorbed.

And the use of crop rotations for fertility and pest control nearly eliminates chemical contaminants in runoff water. Herb comments that "fields with clover are so much better than just adding terraces and waterways. We do get big rains. When it comes pounding down, that is when you see the improvement in water infiltration on these fields."

Bartel Crop Rotation Summary

Yr. in Rotation	Yr. 1	Yr. 2	Yr. 3	Yr. 4
Basic Rotation	Wheat/Cowpeas or Winter peas	Soybeans	Wheat/Sweet Clover	Sweet Clover or Alfalfa
Yield Goal	Wheat - 50 bu. Cowpeas - 75#N	30 bu.	Wheat 50 bu.	200# N
Seeding Rate	Wheat- 2 bu./ac. Cowpeas- 40 #/ac.	174,000	Wheat - 2 bu./ac. Sw. Clover 7#/ac.	None
Tillage	Plow Sweet Clover Disk 1 or 2 times Field Cult. 1	Disk peas 1 or 2 Field Cult. 1	Disk - 1	None
Fertility	Sweet Clover green manure crop	Cowpea or Winter pea green manure	Preceding green manure crops & Soybean N	Nothing added
Weed Control	Preplant tillage Disk after Wheat harvest	Preplant tillage Preplant herbicide Cult. 1 or 2	Preplant tillage	Mow if necessary
Cover Crop	Cowpea residue winter peas,	Wheat	Sweet Clover	Wheat

Bartel Farm Characteristics

Farm size: Started project with 180 Acres. Purchased two 80 acre tracts. Practices applied to 340 acres.

Crops: Wheat, soybeans, alfalfa, and legume crops (sweetclover, cowpeas, winter peas, and sudan grass) and perennial grasses (Eastern gamagrass and native prairie).

Livestock Enterprises: None

Equipment: Grain drills, sickle bar & rotary mowers, tillage equipment and row crop cultivator. **Labor & Management Practices:** Herb and Pat provide the management and labor. Hires combining and row crop planting.

Crop Management Practices: Overall system centered around soil building and increasing organic matter. Uses winter and spring peas, cowpeas, sweetclover, alfalfa and sudan to produce biomass and suppress weeds.

Weed Management: Minimum use of chemicals along with cultivation in soybeans. Suppress weeds with cover crops, mow when necessary. Use weeds as a cover crop.

Insect and Disease Management: Crop rotation.

Soil Fertility: Soil test and lime as necessary. Interseed legumes in wheat. Plant wheat after soybeans. Legume cover crops and rock phosphate for nitrogen and phosphorous and to increase organic matter.

Crop Yields: Wheat- 50 to 75 bu./acre; soybeans - 25 to 35 bu./acre; cover crop biomass - 5 to 10 ton/acre.

Water Quality Management: Substitute legume green manure cover crops for N fertilizer (per soil tests), minimize herbicide usage, establish native grasses and forbs in critical drainage areas. Establish woody shrubs wherever water leaves the farm.

Marketing: Conventional grain marketing outlets, looking for high protein wheat market. May pursue opportunity to market legume cover crop seed.

Profit Strategy: Maintain healthy, highly productive soil, low input costs, and maintain good yields and low capital costs.