SUSTAINABLE FARMING Quarterly

Vol. 3 No. 3 December 1991

'Living Soil' Depends on Microbial Management

The author, David Granatstein, is project coordinator of the six-state Dryland Cereal/Legume Project based at Washington State University, Pullman.

The concept of the "living soil" is receiving increased attention from farmers, consumers, and policy makers as an important component of any sustainable agriculture. Terms such as "soil health" and "soil quality" are heard in scientific circles as well as farmer clubs. While many are interested in improving their soil, time-tested strategies are scarce. Fortunately, researchers from the Columbia Basin Agricultural Research Center (CBARC) at Pendleton, Ore., have some ideas for dryland farmers.

The CBARC is located in northeastern Oregon, where wheat-fallow cropping (16.7 inches average precipitation) and silt loam soils predominate. Several different long-term rotation and residue management experiments have been in place for 25 to 60 years (See Table 1, page 2).

Harold Collins, a microbiologist, and Paul Rasmussen, a soil scientist, both with the USDA Agricultural Research Service, have studied the soil properties of the long-term plots. "Public concern about the environmental impacts of farming is here to stay," Collins said. "Improving the status of the soil organic matter is an important goal, and we hope to show how management practices affect it."

What is soil organic matter?

Soil organic matter can be broadly defined as the sum of all carbon-containing materials in the soil, including undecomposed straw, stable humus, and soil microbes. Generally, tests for soil organic matter exclude the undecomposed materials and focus on the stable compounds, which are the result of microbial breakdown and synthesis. The organic matter contains large amounts of nutrients, especially nitrogen, phosphorus, and sulfur, which are slowly released by microbial action. The microbes are considered to be the most active portion of the organic matter, as they are constantly growing and dying. In doing so, they can have a major impact on the availability of plant nutrients.

In the Pendleton study, soil and microbial carbon and nitrogen, soil pH, microbial respiration and populations, and seasonal microbial changes were measured in the plots. Many of these factors interact closely with one another. For example, the ratio of carbon:nitrogen in semi-arid soils is quite stable at 11-13:1. Thus, as carbon is lost through erosion or intensive tillage, the total nitrogen will decline as well. Soil microbes rely on soil carbon and crop residues for food, and microbial levels will generally move in tandem with soil carbon levels.

Microbes can be measured in

More SOIL, page 2

Montana farmers share challenges and risks of trying new techniques

An informal but well-organized program in which Montana farmers and ranchers exchange ideas and share the risk of developing new sustainable practices through on-farm testing has enjoyed remarkable success in its first two years.

The grassroots Alternative Energy Resources Organization (AERO) in Helena organized nine farm improvement clubs in 1991 for farmers and ranchers who desired to enhance their agricultural resources and at the same time protect groundwater quality and the environment.

AERO has provided technical assistance and small grants for seed, inoculant, soil tests, speakers, and travel, allowing the clubs to undertake field trials, demonstrations and educational projects. As the farm improvement club program has expanded, other private funders have pitched in.

The farm improvement clubs tentatively plan to convene Jan.10 in Great Falls, Mont., to share project results, details of the design and implementation of their projects, successes and failures, and to refine plans for the 1992 growing season. Non-members interested in attend-

More CLUBS, page 4