

SUMMARY RESEARCH PROGRESS REPORT FOR 2001 AND RESEARCH PROPOSAL OF 2002

Submitted to:
SLV Research Center Committee
and the
Colorado Potato Administrative Committee Area II

TITLE: Utilization of Compost made from Agricultural and Forestry Wastes for Improving the Economic and Ecological Sustainability of Agronomic Crop Production on Low Organic Matter Soils in the San Luis Valley of Colorado.

PROJECT LEADERS: Rick Zink, Merlin Dillon, and Andrew Houser, CSU

PROJECT JUSTIFICATION: The main objective of this study is to improve water conservation and sustainability of crop production on the low organic matter soils of the San Luis Valley, Colorado. This will be accomplished through on-farm demonstrations that will examine the impact field incorporated compost made from agricultural and forestry wastes has on: 1.) reducing the use of synthetic fertilizers and fungicides, by improving nutrient retention in the root zone and the health and diversity of the soil's biomass, 2.) improving water utilization, thereby reducing water and power use in center-pivot irrigation systems, 3.) crop yields and costs of production for potatoes, barley and alfalfa.

Two agricultural waste streams, sawdust and cull potatoes, being generated in the San Luis Valley have become problematic for their local industries. Logs harvested from the National Forests surrounding the San Luis Valley are milled locally, generating sawdust for which there are very few feasible uses. In a 1997 Colorado State University (CSU) survey of western Colorado mill operators, the second most mentioned problem was that of mill residues (sawdust). Most of this sawdust has been stockpiled at locations near the mills. Potatoes are the area's most economically important crop, and the foundation of the local economy. On average, about 9.6% of each year's potato crop is not marketable, due to size, appearance or presence of disease.

These cull potatoes have become particularly problematic, since the devastating disease, late blight (*Phytophthora infestans*), has occurred in the San Luis Valley, requiring an increase in fungicides used as protection against this disease. This is an additional economic burden to growers and adds a negative burden to the environment. Late blight spores from infested cull piles can be transported by wind to infect the new growing crop, repeating the disease cycle. Research conducted in Maine has demonstrated that properly managed, hot aerobic composting of cull potatoes with sawdust will destroy disease pathogens (including *P. infestans*) and produce an excellent soil conditioner. Each ton of fresh compost contains 12 lbs of nitrogen, 4 lbs of phosphorus, 9 lbs of potash, 18 lbs of calcium and about 400 lbs of organic matter.

The sustainability of most soils used for crop production in the San Luis Valley would be improved by the addition of compost. Soils in the San Luis Valley used to produce agronomic crops are sandy and extremely low in organic matter (less than 0.5% OM). The water table in many areas of the valley is quite shallow, 5 to 30 feet below the surface. This creates the potential for nutrients applied to the crops to be leached through the soil to the water table,

resulting in the loss of nutrients and contamination of the ground water. Addition of organic matter through incorporation of compost would help to improve the soil structure and its nutrient and water holding capacity, reducing the potential for nutrient leaching and improving water conservation.

The impact of this project will be assessed in several ways. The quantity of compost applied to San Luis Valley cropland will be monitored annually. The number acres that have compost applied to them will be recorded. Growers using compost will be surveyed to assess changes in water and fertilizer utilization. Volumes of waste sawdust and cull potatoes that are transformed into compost will be monitored. Stockpiles of sawdust will be reduced. Disposal of waste potatoes will become less of a burden on the industry.

PROJECT STATUS: Ongoing

SIGNIFICANT ACCOMPLISHMENTS FOR 2001

- Established six composting study sites (four potato sites and two alfalfa sites).
- Samples were taken of the soil and the compost to determine the quality of the soil and compost.
- Soil moisture readings were taken at ½ hour intervals on the composting sites throughout the growing season.
- Disease readings were taken at each potato site, which looked at the incidence of Rhizoctonia on stems, Rhizoctonia on stolons, and early blight lesions.
- Three cuttings of alfalfa were evaluated on each alfalfa site to determine the effect composting has on alfalfa yields.
- Potatoes were harvested and were evaluated to determine the effect composting has on potato yields and Rhizoctonia severity on tubers.
- Compost was spread on each site for the following growing season.

OBJECTIVES FOR 2002:

- During the growing season disease levels, crop health, water utilization and nutrient uptake will be measured.
- Three cuttings of alfalfa will be harvested for yield during the 2002 growing season.
- Crop yield data will be collected at the end of the growing season for potato and barley crops.
- All data collected will be summarized and a summary bulletin will be published in print and on the Colorado State University (CSU) Website.
- Field visits upon request to each site will be conducted during the growing season.
- A summary of results will be reported at the potato and grain grower conference in the San Luis Valley in 2003.

FUNDING REQUEST:

2001 Request: \$5,000

2002 Request: \$5,000