

**COMPREHENSIVE AND
SUMMARY RESEARCH PROGRESS REPORT FOR 1999
AND RESEARCH PROPOSAL FOR 2000**

Submitted to:

**SLV Research Center Committee
and the
Colorado Potato Administrative Committee (Area II)**

TITLE: Using Crops to Control Pests and Enhance Potato Production

PROJECT LEADERS: Merlin Dillon, Area Extension Agent, Agronomy, Colorado State University Cooperative Extension and Dr. Jorge Delgado, USDA-ARS, Fort Collins, CO.

PROJECT JUSTIFICATION: Nematodes, Verticillium (early dying), and powdery scab have become important pest in SLV potato production. Green manure crops show great potential in reducing the impact of some pests. The effectiveness of these crops is not questioned; it has been demonstrated in other areas. What is needed, however, is information on how these crops will grow in our unique environment, especially when planted later in the season after another crop. Dedicating one entire cropping year for a green manure crop is very expensive for the growers (no crop income). Fumigants can be used to control these pests; however, these chemicals are also very expensive and soon may not be available.

Research in other areas has shown the benefit of sudan and rape crops on these pests. In our area, Richard Zink conducted three years research into crop rotations showing the benefit of green manure sudan on reducing Verticillium propagules/gram soil. In that research, the sudan was planted early June and worked into the soil in late August. One treatment of this project would produce sudan harvested for hay and incorporated into the soil after a hard frost. A hard frost on immature sudan produces prussic acid (HCN) which will reduce these pests in the soil. A second treatment would encourage growth of barley volunteer and a third would seed rape into growing barley.

PROJECT STATUS: Third Year

SIGNIFICANT ACCOMPLISHMENTS FOR 1999:

Three on-farm trials were attempted.

1. On Summit Farms, Humus rapeseed was aerial seeded into growing winter wheat. However, the winter

wheat was very thick and late planted, late maturing. As a result, the rapeseed that germinated grew spindly and was hard to find after the wheat harvest. This was a bust.

2. On Phil Smartt's Farm, rapeseed was provided and he drilled it into the worked up barley straw. This too was unsuccessful. Growth was slow and then the very cold temperatures in late September burned the small rapeseed plants.

3. The third on-farm trial was much more successful. On Bob Mattive's home quarter (Worley Seed Farm), an extra 30 #/acre of nitrogen was applied to one half circle. Rapeseed (10 #/acre) was applied with the fertilizer on a 20 acre strip. The other half circle was irrigated more than normal but did not have the fertilizer nor the rapeseed. Adding rapeseed did not increase the dry matter production; however, rapeseed

Table 1. Green manure dry matter production, Worley Seed Farm, Rio Grande Co Roads 6N & 4E, 1999. By Dr. Jorge Delgado, USDA-ARS, Ft. Collins, and Merlin Dillon, Area Extension Agent, Agronomy.

Treatment	Dry Matter, lbs/acre
Volunteer Barley	625
Volunteer Barley + Nitrogen (N)	1482
Volunteer Barley + N + Rapeseed	1121

plants have chemicals which might reduce potato disease and improve potato production. The rapeseed portion of the dry matter (1121 #/acre) was measured at 206 #/acre.

The extra nitrogen (30 #/acre) increased the green manure production from 625 to 1485 #/acre, an increase of about 700 lbs/acre.

Soil nitrogen was sampled after barley harvest and nitrogen in green manure nitrogen will be determined. These analyses have not yet been completed.

OBJECTIVES FOR 2000:

The purpose of the project is to: demonstrate experimental green manure practices on farmers on-farm demonstrations. More real conditions and constraints exist on farmers fields than could be duplicated at the Research Farm. For this reason, these demonstrations would be conducted on fields of farmer cooperators. Extra costs to the producer would be subsidized since these practices are highly experimental at this point

1. Determine the feasibility of planting winter rape into a growing barley crop. This would provide the winter rapeseed an early start and greatly increase the potential production of the rapeseed. After barley harvest, that field would be managed to increase the production of both barley volunteer and rapeseed growth.

2. A second trial on-farm trial would grow sorghum-sudan hybrid for forage and biocontrol. The field planting, forage produced, and other management factors would be recorded and documented.

3. A third on-farm trial would enhance volunteer barley production with extra irrigation and extra

nitrogen.

Specific objectives include:

1. To determine the dry matter production of winter rape planted into growing barley. The growing winter rape and volunteer barley would add crop material to be incorporated into the soil and release nitrogen through decomposition during the potato growing season.

2. To determine the hay yield and green manure dry matter produced by planting hybrid sorghum-sudan, harvesting hay, and turning the regrowth into the soil for biocontrol effects on nematodes and verticillium.

3. To determine the dry matter production of volunteer barley and the extra dry matter produced by adding nitrogen and irrigation water.

2000 Request:

Plot materials (stakes, herbicide, bags, etc)	\$500
Seed, Seeding, fertilizer reimbursement	\$1000
Student Labor	<u>\$1000</u>
TOTAL:	\$2500