

SUMMARY RESEARCH PROGRESS REPORT FOR 1989
AND RESEARCH PROPOSAL FOR 1990

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

TITLE: Evaluation of Advanced Clones for Potato Leafroll Expression

PROJECT LEADER: Robert D. Davidson

PROJECT JUSTIFICATION: Disease management strategies in the San Luis Valley are of critical importance to all potato producers. Over the past few years there has been considerable effort put forth in controlling potato leafroll in the potato crop. The success of this effort has been outstanding, both in seed fields and in commercial lots. However, we know that varieties differ in their attractiveness to the aphid vector, their ability to become infected with leafroll and to spread this infection from one plant to the next. Potato varieties which act as symptomless hosts for the virus can provide a reservoir of inoculum which might act as an infection source for those varieties which are susceptible to leafroll symptoms.

PROJECT STATUS: This is an ongoing project which has been funded the last several years.

SIGNIFICANT ACCOMPLISHMENTS FOR 1989: Seven advanced clones were screened for their symptom expression to leafroll. Inoculation and leafroll infected occurred early in the growing season. All clones except AC82263-1 showed adequate leafroll symptoms in the field after they had reached a height of 12-14". AC82263-1 showed mild symptoms at the time of the last reading. However, in the in-field spread experiment it did show 3 plants with symptoms, so it may not be a problem. This clone will be grown out in the SLV this summer to compare its timing and intensity with other known leafroll expressing varieties. All clones also had their in-field spread of leafroll compared against other standard varieties. Overall results suggest that most of the new clones will not pick up leafroll any quicker than either Russet Burbank or Russet Nugget, but that probably none of them are resistant to spread as are Centennial Russet and Sangre. Two clones, the AC81592-2 and C082142-4, may have a higher rate of leafroll spread in the field than would normally be expected. This could have implications for growers who either have leafroll problems or do little roguing in their cleanup efforts.

OBJECTIVES FOR 1990: Ten to fifteen advanced clones from the Colorado Cultivar Development program will be inoculated and evaluated for leafroll symptom timing and expression and for in-field leafroll spread.

FUNDING REQUEST:

1989 Allocation: \$ 750.00

1990 Request: \$ 750.00

Evaluation of Advanced Clones for
Potato Leafroll Expression
1989

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Materials and Methods

Clones were planted in the SLV and inoculated with viruliferous aphids (aphids containing leafroll) when they were 6-10" in height or approximately 3 weeks after emergence. Aphids were killed after three days of feeding and the plants were allowed to grow out to maturity during the season. Observations were made on weekly intervals for the presence of current season leafroll symptoms. Four tubers from each of five plants, both leafroll infected and healthy, were harvested in September. One half of the tubers were treated as normal winter test samples for the Potato Certification program and planted in Oceanside, Ca. in November. Readings for leafroll were taken in February. The other half of the tubers will be planted back in the SLV in 1990. In addition, the clones plus several standard varieties were planted under conditions which would encourage natural in-field spread of leafroll. Three replications with 12 tubers per clone or variety per replication were used. Between each set of 12 tubers a leafroll infected Russet Burbank tuber was planted. The plots were grown to maturity without insecticides. Two tubers per plant or a total of 24 tubers per replication were harvested in September. All tubers were treated as normal winter test samples and planted in Oceanside, Ca. Readings for leafroll were taken on the same dates as the clonal evaluation.

Results and Discussion

All clones except AC82263-1 showed acceptable leafroll symptom development in California. (see Table 1) The AC82263-1 had mild symptoms overall and appeared to be developing symptoms later than the other clones tested. It will be grown this summer in the SLV to compare against other known standard varieties.

The natural in-field spread results would indicate that all of the clones tested will pick up leafroll when conditions are right. (See Table 2) However, most of the clones did not demonstrate spread rates that would be higher than either Russet Nugget or Russet Burbank. Two clones, AC81592-2 and CO82142-4 did show much higher rates than the others. These rates were comparable to the AC79100-1 which did have leafroll spread occurring in the field when grown by the certified seed potato growers. This should be kept in mind as these clones are released to growers, especially when considering strategies for roguing of the stocks and potential placement in the field near known sources of leafroll. This particular project has demonstrated over years that varieties known to be resistant to leafroll spread such as Penobscot, Katahdin, Centennial or Sangre rarely if ever show spread during the season under SLV conditions. Other varieties, however, which are known to be susceptible to leafroll spread will usually indicate some spread occurring during the season and often times at fairly consistent rates from one year to the next. This in turn should give us some confidence that the readings being obtained are real and should be considered when dealing with these clones.

Table 1: Clonal symptom expression for leafroll (1989 readings)

<u>Clone #</u>		<u>Symptom expression (0-3)</u>	<u>#pos/#emerged</u>
AC75430-1	3	CC, WP-LL	5/5
AC81592-2	3	CC, WP	3/6
AC82263-1	1	Symptom intensity very light overall	2/5
C08118-2	3	CC, LL (very strong lower leaf roll)	4/4
C08138-6	2-3	CC, LL (very strong lower leaf roll)	3/4
C08194-4	3	CC, LL (very strong lower leaf roll)	3/3
C082142-4	3	LL, light CC	4/4
Russet Nugget	1-2	LL, light CC (plants were very small)	1/5
WNC230-14	0	Too small to read	0/3
Centennial	0	Too small to read	0/4
Russet Burbank	3	CC, WP	2/3
Sangre	0	Too small to read	NE
Ute Russet	0	Too small to read	0/6

Rating for the symptom expression is 0 for no symptoms to 3 for strong typical symptoms. WP indicates whole plant involvement, LL indicates only lower leaf rolling and CC indicates good color change evident as compared to the healthy controls.

Ratings for the clones would indicate that all except AC82263-1 should show leafroll symptoms by early to mid-season under SLV conditions (by mid-July).

Table 2: Clonal evaluation for natural in-field spread of leafroll in the SLV
(1989 readings)

<u>Clone #</u>	<u>#pos/#emerged</u>	<u>Percent spread</u>
AC75430-1	0/12	0
AC81592-2	15/57	26.3
AC82263-1	3/57	5.2
CO8118-2	5/55	9.1
CO8138-6	4/55	7.2
CO8194-4	2/54	3.7
CO82142-4	12/62	19.4
AC77101-1	2/26	7.7
AC79100-1	8/37	21.6
Green Mountain	0/57	0
Houma	0/62	0
Katahdin	0/58	0
Keswick	6/59	10.2
Penobscot	0/57	0
WNC230-14	0/25 (very small)	0
Russet Nugget	5/57	8.8
Russet Burbank	0/25 (very small)	0
Centennial	0/40	0
Sangre	0/3 (very small)	0
Ute Russet	1/46 (very small)	2.2

Results indicate the cumulative data collected from harvesting two tubers per plant, with 12 plants per replication and three replications total. There were 72 tubers planted for each clone or cultivar tested.