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To: S.L.V. Research Center Committee

From: Clark H. Livingston - Principal Investigator  
C.S.U. Plant Virus Investigations - Project 118

Subject: Summary of Research Findings and Research Plans for 1984.

Major research efforts are being directed toward the epidemiology of leafroll in the S.L.V. The aphid trap pan data of Gene Nelson's for the years of 1975 - 1978 as well as the potato seed certification records pertaining to leafroll for the years of 1977 - 1982 have been perused, collated and subjected to the appropriate statistical analyses. This information in relation to our survey of potentially virus infected plants has now made it possible to draw guarded conclusions regarding some of the epidemiological factors associated with leafroll in the S.L.V.

1. Aphid trap pan data collected at nine locations throughout the valley for the four year period, show that there was a significant difference between locations but not between years. The greatest number of aphids were trapped in the area adjacent to U.S. 285 between the Six Mile Road and Colo. 112. The aphid count was significantly highest at the Experiment Station location on the Nine Mile Road.
2. An area (A) of 66 square miles centering on U.S. 285 and extending from two miles north of Monte Vista to two miles north of Colo. 112 was compared with the seed growing area (B) peripheral to area A regarding the incidence of leafroll in Russet Burbank for the 1980 and 1981 growing seasons. In 1980, there was no significant difference between areas A and B. However, in 1981, there was a significantly higher percentage of certified seed fields in area B which had progressively increasing percentages of leafroll readings from first and second field inspections through the winter test.
3. The percentage of leafroll found in the first and second inspections were compared with the winter test readings for Russet Burbank and Centennial seed lots for the six year period (1977-1982). Ninety two percent of the winter test readings were significantly higher than either the first or second inspection readings. This suggests that a "within"

season infection and leafroll spread had occurred. This widespread increase throughout the seedlots also suggests that inoculum has come from sources outside of the certified fields (interfield) rather than from within the field (intrafield).

4. Foliage samples were obtained from 1390 individual common weeds representing 10 families and 17 genera growing along fence lines and within potato fields. The foliage was tested serologically by ELISA for the presence of both beet western yellows virus (BWYV) and potato leafroll virus (PLRV). Only two black nightshade and one field bindweed plants reacted positively. This finding suggests that weeds are not serving as an important source of inoculum and that the principal inoculum source must therefore be PLR-diseased potatoes.
5. Lettuce, a common crop plant grown in the S.L.V., was tested for both viruses by ELISA. Lettuce was suspected as a potential host for BWYV as this virus is known to cause the June yellows disease of lettuce in California. All 17 suspected lettuce foliage samples proved to be negative for BWYV.
6. Appropriate indicator, or trap plants, were placed at seven strategic sites within the S.L.V. in 1980. Plants were left in the field for a period of one to two weeks of exposure to the feeding and colonization by aphids which might be viruliferous. Exposed plants were taken to C.S.U. for incubation and ELISA testing. New virus-free plants were then placed at each site. The first set of plants were placed at the test site on July 17 and replaced on July 31. Forty-eight percent of the first set of plants tested positive for PLRV. This method, although limited in scope, continued to be a reliable test for the presence of viruliferous aphids throughout the remainder of the growing season (September 18). However, there is need for expansion of this scheme to collect data throughout the growing season, from the time of plant emergence to maturity (16 weeks), in order to detect early season spread as well. GPA trap pan (IPM) data were not available for the 1980 season to correlate with our findings.

#### Planned Research for 1984

Cooperative - Plant Virus Investigations and Entomology Research

Investigators - Clark H. Livingston - Plant Pathology  
 Whitney Cranshaw - Entomology  
 Gene Nelson - Entomology Extension  
 Robert Klein - Plant Pathology Ph.D. Graduate Student

Briefly stated, the research planned consists of the following four elements:

1. Establish elevated "sticky" yellow aphid traps at 13 locations with seven on east west line along the Seven Mile Road and three north and three south of the Seven

Mile Road adjacent to the Gun Barrel Road. Traps will be spaced at two mile intervals forming a cross pattern. Each trap will be examined for aphids with counts made, then surface cleaned and recoated each week for 16 weeks beginning June 1.

2. Indicator host plants will be placed at each of the same sites on the same schedule and returned to CSU for incubation and ELISA testing.
3. Attempts will be made to trap live aphids by driving the roads each week with a large trap net extended from the vehicle. Trapped aphids will be tested for PLRV.
4. Sticky trap and trap plant data will be correlated with Day Degree data obtained during the growing season to determine its relationship to aphid activity.

We, as a cooperative research group, feel that these studies are essential if we are going to solve the leafroll problem in the S.L.V.

## Potato Leafroll Disease Research - Project 118

Clark H. Livingston and Cooperators

Budget Request

<u>Item</u>	<u>Amount</u>
Travel - Vehicle	\$ 2440.00
Travel - Expenses	2880.00
Supplies - Greenhouse and Field	400.00
Labor - Greenhouse C.S.U.	500.00
Total	<u>\$ 6220.00</u>