

# Pepper News

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## Five Year Progress Report

### A Little History

The California Pepper Commission has been in existence for five years now. It's time for a look back and a progress report on what has been done.

The Commission was created by an industry vote in May of 1989. It was able to immediately begin its mission of research into the problem of pepper viruses at that time due to the help of the California Pepper Improvement Foundation (CPIF). They loaned the Commission some startup funds so that things could get going while waiting for assessment income to come in. The CPIF also allowed the Commission to pay back the funds owed to it over a three year period. Various handlers also chose to prepay their assessments so that the startup costs could be retired quickly.

### Research Purposes

Over the years the Commission has funded three main researchers and several others in-between. In the next several paragraphs I want to overview the accomplishments of the various researchers and projects. I hope that this will help you understand the importance of the work that has been done and the progress that has been made. Understand that many of the items listed here may seem insignificant in your day-to-day growing of peppers - but have great significance in the eventual solving of the problems of virus.

The thought that seems to come up again and again with the research work of the Commission is that the row we have chosen is long, and the hoeing tough. No one else has chosen this row — not the growers, or the seed companies, or the multinational corporations — but this must be done and only the California Pepper industry has shown the determination to tackle it. In the end, the rewards will be great.

### Bryce Falk

The original researcher engaged by the Commission to study the virus problem was Bryce Falk. Based at UC Davis, Bryce and others who would join in on the project along the way said, —“Our ultimate goal is to identify and characterize sources of resistance to the pepper pathogens, and to incorporate as many sources of resistance as possible into individual lines to be used by breeding programs, ultimately for

development of horticulturally acceptable, disease resistant peppers.”

Recently the CPIF, who acts as our research review committee, sat down with Bryce and went over the progress of these last years. As they did they came up with the following list of accomplishments:

Methods have been developed for quick and accurate detection of the most common viruses which affect peppers in California. Antisera for ELISA testing has been made available and has been useful in virus survey work. Antisera for Cucumber Mosaic virus (CMV), Tobacco Etch virus (TEV), Pepper Mottle virus (PeMV) and Potato Virus Y (PVY) have been produced and proven their worth.

CMV and the potyviruses TEV, PeMV, and PVY have been identified as the most common viruses infecting peppers. Both groups of viruses have been shown to be highly variable, with many different strains having been identified. Virus strains have different effects, so a range of viruses are used when challenging plants with a particular disease.

Sources of resistance have been identified within species related to pepper, to both CMV and potyviruses. These sources cross easily with pepper and should allow for combining of this resistance into our pepper types and work to accomplish this is underway. Seed breeders state

that this is a major hurdle to cross. Until there are viable sources of resistance to use as breeding material, progress cannot be made toward the desired goal. Also finding a source of resistance that is compatible with the target plant is a major accomplishment.

The results of intensive survey work show other viruses such as Tomato Spotted Wilt, Alfalfa Mosaic, Beet Curly Top, and other unidentified viruses are present in California, but are not a widespread problem in most years. However, they can be devastating in localized areas.

Another outcome of the survey work was proof that multiple virus infection of the same plant and/or in the same field

is common. This has reinforced the need for multiple resistance as an essential goal.

In summary, Dr. Falk has laid a solid foundation for understanding the virus situation in California. He has also developed methods and germplasm to allow for more progress in the addition of the resistance in the future.

### Paul Bosland

In the 1990 year, a second project was added. Dr. Paul Bosland of the University of New Mexico agreed to work on breeding for resistance to Verticillium wilt. The work was to add Verticillium wilt resistance into bell, jalapeno, and Anaheim pepper types.

With this project also, the researcher has successfully identified a source of resistance to Verticillium after screening 125 different sources. Through extensive crosses of the source material with varieties of peppers, Dr. Bosland is separating out those plants which carry the desired trait. This trait is difficult to transfer due to the multi-gene character of the resistance. In the third cycle of screening and selection, 75% of the plant population now shows resistance to the disease and seed has been made available to seed companies. He continues to refine and enhance these lines as well as exploring new sources of resistance. A recent source has shown itself to be an even stronger source of resistance than the one presently used.

### Molly Kyle

In the third year of the Commission the third member of the trio was added to the research group. Molly Kyle of Cornell University in Ithaca, New York proposed a project aimed at "improving understanding of the genetics of resistance to CMV and the potyviruses, and the development of screens and tools to expedite the transfer and combination of the resistances into various commercial types. We are also proceeding to combine these resistances with TMV and dominant resistance to TSWV (tomato spotted wilt)". The financial support of the Pepper Commission helped win the support of a three year USDA competitive grant for \$260,000.

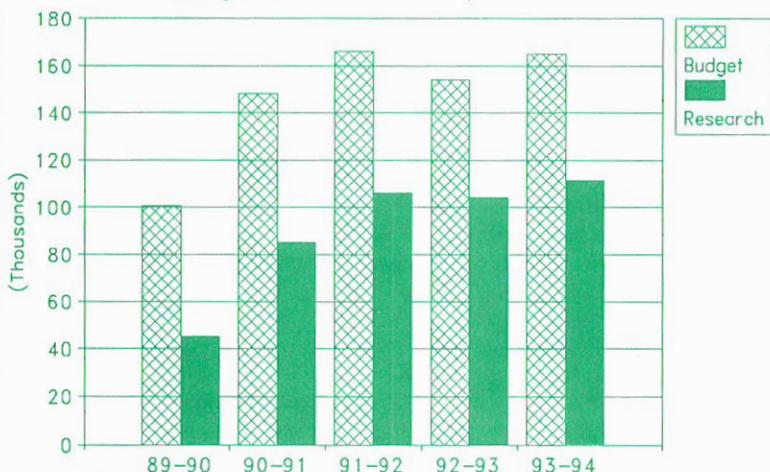
Dr. Kyle works on some of the same virus resistance problems as Falk, but from a different angle of attack. Her work has led to the discovery that there are two distinct recessive genes for resistance to the potyviruses, not one as had been previously thought. The present commercial resistance is overcome when CMV is also present. Molly has

identified a different potyvirus resistance which is very stable and is working to combine this resistance with CMV resistance. She is working directly and in collaboration to transfer these genes to leading commercial types. Her studies have also shown a great variability in CMV field isolates. Work exploring genetic engineering strategies to simplify the breeding for resistance continues. Because of the availability of the gene map of a closely related plant, tomato, work in the area of mapping and molecular markers for virus resistance for peppers. This group is developing molecular markers for virus resistance and have provided molecular markers and optimized procedures to a number of other groups who are working on Phytophthora and bacterial spot resistance.

### Other Projects

In 1992 the Pepper Commission financed the publication of a volume on weed control put out by long time farm advisor Bill Fischer. This work recorded many years of effort and experimentation by Mr. Fischer in the control of weeds in pepper fields. This is an extensive work which documents the effect of various chemical weed control methods, both preplant and post-thinning. It includes methods of application and incorporation, susceptibility of various weeds to an array of chemicals, herbicide performance, and the effect of weed control on yield and vigor.

California Pepper Commission  
Budget and Research Expenditures



Recently, Richard Smith has been working on a problem with peppers, powdery mildew. This disease seemed to appear quite suddenly and unexpectedly. As a result, Smith and the Commission worked together with the industry to gain a Section 18 for Bayleton. Work to gain registration of Bayleton on peppers through the IR-4 process has been performed by Smith and financed by the Commission.

### Budgets

The Commission has maintained the same assessment rate over its five year life. It remains at fifty cents per ton for all types of peppers and pepper seed for the equivalent weight "wet". By examining the accompanying "Budget and Research Expenditures" chart, you can see the steady rise in the percentage of income spent on research versus all other expenditures. The initial years were characterized by a need to repay the start-up costs of forming the Commission. As those costs have diminished, the amount and percentage of the budget devoted to research have increased. The Commission works hard to control the costs of meetings and overhead. Presently better than 2/3 of the budget is allocated for research. Actual expenditures usually total near 70% of the money spent.