

\$104,444, and the layman's reports for those projects are included with this report.

Financial Report

Fiscal Year: May 1, 2000 through April 30, 2001

Account Name *Amount*

INCOME

Carry-over from 1999-2000	\$ 148,789
Assessment Income, 2000-01	179,090
Interest Income	<u>10,777</u>

Total Income **\$ 338,656**

EXPENDITURES

Management Services	31,500
Legal Counsel	797
Audits	1,672
Office Supplies	1,477
Telephone	958
Postage	813
Reports & Publications	60
Travel & Mileage	228
Meetings	761
Insurance & Taxes	648
Marketing Branch	4,385
Production Research	104,444
Chemical Research	<u>2,799</u>

Total Expenditures **\$ 150,542**

Carry-over to 2001-02 188,114

Total Expenses & Reserve **\$ 338,656**

California Pepper Commission 2001-04

Producer Representatives

Members		Alternates
Burt Silva King City 831/385-1428	1	Michael Griva Greenfield 831/674-5835
Ryan Talley Arroyo Grande 805/489-2508	2	Danny Pereira, Jr. Oxnard 805/986-8568
Mike Chuck <i>Vice-Chairman</i> Gilroy 408/848-6373	3	Dan Fiori Gilroy 408/842-1809
Bob Giampaoli Le Grand 209/389-4576	4	Nick Maddalena Chowchilla 559/665-2403
Richard Bradford Heber 760/352-2364	5	Abel Balderama Coachella 760/399-4278

Handler Representatives

	Classification	
Dave Veneman Escalon 209/838-4040	Bell Pepper Processing	Mark Edsall Modesto 209/538-5450
Vacancy	Dehydrated Chili Peppers	Dan Goman Turlock 209/667-2777
Glen Fischer <i>Chairman</i> Saticoy 805/647-5266	"Other" Pepper Processing	Kurt Williams Fresno 559/237-5583
Tim Baloian Fresno 559/485-9200	Fresh Pepper Handler	Edward Chell Camarillo 805/987-7702
Robert Heisey San Juan Bautista 831/623-4554	Pepper Seed Handler	Ken Owens Hollister 831/636-4882

Public Representatives

Vacancy **Vacancy**



Pepper News

California Pepper Commission, 531-D North Alta Ave., Dinuba CA 93618: Ph. 559/591-3925

June, 2001

Annual Report Issue

2000-01 Year in Review

This past fiscal year (May 1, 2000 to April 30, 2001) has been a rather different one for the Commission, with the staff's attention being directed to chemical issues more than ever before. *(See following three articles)* In dealing with the chemical issues we were talking to Commission members, growers, and the California Department of Pesticide Regulation, as well as various chemical companies.

Interestingly enough, this "communication" caused an overdraft in the budget in a rather unusual place – the phone bill. *(Complete financial report on pages 5 and 6)* Overall, though, the Commission is in such good financial shape that they voted for a reduction in this year's assessment rate. *(Full article on page 2)*

As usual, we have included layman's reports on the Commission's funded research activities for the past year. If you have any questions please call Jerry Munson, Commission Manager, or Ken Melban, Assistant Manager at (559) 591-3925.

Registration on Dual Magnum® Pending

The Commission has been working to secure a 24C (SLN) in California for the herbicide Dual Magnum on bell peppers. In January pepper growers asked the Commission to pursue the possible registration based on information from Commission sponsored trials conducted by Richard Smith, Monterey County Farm Advisor. *(Smith's report, page 4)* The trials reported that Dual Magnum was very effective in weed control, especially hairy nightshade.

The Commission contacted the manufacturer,

who agreed to work towards the registration with one condition – any grower wanting to apply the product must return a notarized "waiver of liability" agreement. In essence, this waiver protects the manufacturer from any liability if the grower experiences crop damage. After conducting an informal survey of growers, the Commission determined that even with the attachment of the "waiver of liability," this was a product growers were very interested in using. The process in getting a new material registered in California can be very lengthy, but as of this writing the Department of Pesticide Regulations has told the Commission that within 45 days we could expect to have the 24C. We realize this is late for this year, but it should provide a much needed pre-emergent herbicide for next year.

Section 18 on Rally®

For the 5th consecutive year it appears that Rally, through the efforts of the Commission, will once again be registered on peppers in California under a Section 18. The current Section 18 expires on August 17, 2001, and the California Department of Pesticide Regulation has assured the Commission staff that a new registration will be issued before that date. Rally is currently the only effective and economical compound growers have in their arsenal to fight powdery mildew.

Commission Funds Fungicide Trials

The Commission staff, in pursuing the Rally® Section 18, discovered that another fungicide, Quadris®, was working its way through the registration process. The proposed label includes control of

powdery mildew on peppers, and it was suggested that a full registration on Quadris would come before Rally. Further, there was concern that if Quadris became fully registered, the Section 18 on Rally would not be renewed.

Based on this information the Commission is sponsoring two fungicide trials this year that will compare the efficacy of three compounds – Rally, Quadris and Cabrio, in controlling powdery mildew. The Commission is excited to take a more proactive approach on behalf of the growers to determine not only the most effective, but also the safest products in this ever changing climate of chemical restrictions.

Assessment Rate Lowered for 2001-02

At the Pepper Commission's annual meeting on April 19th the Commission decided to reduce the assessment rate for 2001 to thirty cents (\$.30) per ton on fresh peppers, with proportional reductions on dehydrated peppers and pepper seed. This is a 40% reduction from previous years.

The Pepper Commission has traditionally been very conservative with the industry's money, using it only for research projects that are designed to help growers produce their crop as efficiently as possible. Over the eleven years of the Commission's existence, the assessment rate has never varied from the \$.50 per ton equivalent rate. During the past couple of years, however, some of the disease pressures the Commission has been working on have become less intense, and that, along with a lack of good, sound research projects, has reduced the research expenses and left the Commission with a larger-than-needed reserve.

The Commission was hesitant to reduce the assessment, not because they felt the extra money would be needed this year, but because they knew it would have to be raised again in the future, and the increase might not sit well with the industry. However, because there is no one on the Commission who wants the industry members to be paying more than necessary for the functions of the Commission, the rate was reduced this year, even though the Commission's reserves will be reduced by that action. The assessment rate will probably have to go back up in the next year or two, but that will be affected by the crop size and the need for the research dollars, which is largely based on the disease pressures the industry is facing.

Breeding for Tolerance to Cucumber Mosaic Virus in Pepper

Molly Jahn, Assistant Professor, Department of Plant Breeding & Biometry, Cornell University

We are completing the last year of a comprehensive backcross pepper breeding program using the two leading sources of CMV resistance (CMR): *C. annuum* 'French Perennial', a Perennial line obtained from INRA, France that compared favorably with other versions of Perennial for stability and uniformity of CMR; and *C. frutescens* BG2814-6.

We are using as recurrent parents for the bell type, the Rogers hybrid 'Verdel' and 'Gadir; a CM V-tolerant (CMT) bell from France derived from *C. baccatum*; and a CM V-tolerant bell derived from *C. annuum* Perennial.

For the Anaheims, we have switched to UF8752, a selection from Paul Gniffke which replaces 'CalCompact648.' This selection is rated as having virtually no pungency with fewer basal branches, little tendency to lodge, large fruit and relatively low pigment concentration. One parent is from Ben Villalon's multiple virus resistance work and should complement our CMV resistant breeding efforts.

During this year, we also increased the CMT jalapenos identified in the preceding year as the best type with the highest degree of tolerance and these are available for trial. Our disease screening protocol involves a cotyledon stage mechanical inoculation followed by two or more subsequent inoculations on older leaves and roguing of all symptomatic plants until after fruit set.

Resistance from both the *C. annuum* and the *C. frutescens* sources refers to the failure to develop symptoms. Virus titer is substantially reduced in tolerant genotypes relative to fully susceptible genotypes, although virus is generally present at levels considered at or near the threshold for a positive ELISA determination, and are slightly although usually not significantly higher than uninoculated controls. To reflect this, we refer to materials we are developing as "tolerant" to CMV. We still feel that the combination of Perennial and the *C. frutescens* sources gives the highest frequency of symptomless progeny.

We now routinely run F₃ progeny screens in order to confirm the tolerance of F₂ plants used for backcrossing, since selected tolerant F₂ plants gave

Greenhouse screening of genotypes. It took us a few tries to iron out technical details in the screening procedure, particularly the production of zoospores. We now have the zoospore system working and have started screening in earnest. We have done first screens on the California and Taiwan material with the virulent UC Davis isolate. We are repeating these screens with our California isolates and hope to have them done by the end of May. We also plan on doing the screens with our other archival fungal isolates. In addition, we have started F1 seeds and will be screening some of these soon. Other F1 plants will be used to generate F2 and BC progeny for future genetic work.

Although we have gotten a slow start on the screening, I believe that our preparatory work will increase the effectiveness and reproducibility of the test. Our main priority this spring is high-throughput greenhouse screening. We may even try some screens in growth chambers.

Field screening. Upon the suggestion of the California Pepper Improvement Foundation members at the meeting last spring, we set up a preliminary field trial in Mike Chuck's pepper field in Gilroy, CA. In summer of 1999, root rot was a problem in this field. In summer of 2000, Mike generously allowed us to plant our genotypes in his field. We did so, planting in random order in blocks of five plants, three replicates of each of the following: Paladin, Fidel, CM334, PI201234, Jupiter, and JEP. We wanted to rely on natural inoculum to test the performance of these genotypes in "real" situations. Unfortunately for our test, but fortunately for Mike's peppers, root rot was not a problem in that field in summer of 2000, at least in our portion of the field.

I want to wait until we have more solid data on the pepper genotypes' greenhouse performance before we do another (more substantial) field trial, perhaps in summer of 2002.

Evaluation of Pepper Germplasm for Resistance to Verticillium Wilt

Krishna V. Subbarao, Department of Plant Pathology, University of California, Davis

A total of 338 pepper lines have been screened for Verticillium wilt resistance against two California isolates of the pathogen. All the PI lines from Mexico

have been tested and we have begun to screen the lines from other Central and South American countries. Of the 136 lines tested this year, 108 were *Capsicum annuum* from Mexico, 6 were *C. frutescens* from Mexico, 3 were *C. a. var. glabriusculum*, and 19 were *C. annuum* from Costa Rica.

Several germplasm lines planted this year had poor germination, and a total of 76 lines were not tested because there were too few seedlings to screen. Resistance to the isolate from Anaheim pepper was more prevalent than to the isolate from bell pepper. The progeny of 38 plants that exhibited resistance during the previous year were screened again to confirm their resistance. They appeared to be more resistant than the new PIs screened this year.

2000-01 Financial Report

The following Financial Report shows the Commission continues to be in excellent financial shape, with the income from marketed peppers again exceeding the Commission's rather conservative budget. Over the past eight years, in an attempt to be conservative, the Commission has budgeted on the basis of receiving income from the equivalent of 270,000 tons of fresh peppers, which would bring in \$135,000 at the \$.50 per ton rate. However, the actual income usually is considerably higher than that, and last year was no exception.

Last year's income wasn't as high as some year's, but was still about 32% over the budget, thus bringing in a \$44,000 surplus, and in addition, the Commission earned over \$10,000 in interest on its reserve funds. At this year's annual meeting, the Commissioners agreed to lower the assessment rate (*see article on page 2*), a move prompted by the carry-over into the 2001-02 year of more than \$185,000.

Insofar as the Commission's expenditures during the 2000-01 year were concerned, they were down from the 1999-2000 year, even though the amount spent on research projects increased by 11%. The overhead expenses were down from the 1999-00 year by over 24%, largely due to the fact that in the previous year, the Commission had to foot the bill for the mandatory 5-year referendum.

During the 2000-01 year, the Commission funded five research projects costing a total of

occasionally give low percentages of tolerant offspring. We have virtually no escapes of susceptible check plants (a couple of plants out of many hundreds over the last three years).

We hypothesized that the relatively low numbers of resistant individuals from resistant F₂ plants may be due to some incompletely penetrant tolerance to the disease (i.e., the tolerance may be exhibited in the F₂ but may fail to be expressed in a genotypically similar plant). We also see incomplete penetrance CMV tolerance in the *C. frutescens* source and occasionally in Perennial. All material generated with this support is available for trial or breeding purposes by parties approved by the California Pepper Improvement Foundation and the California Pepper Commission.

Herbicide Efficacy & Safety in Bell Peppers

*W. Thomas Lanini, Extension Weed Ecologist
University of California, Davis
Department of Vegetable Crops*

Bell peppers are very poor competitors with weeds and thus require large inputs of herbicides and hand labor for weed removal to maintain this crop. If the herbicide being used caused some injury or slowed the growth of peppers, reducing the rate could also result in increased pepper yield. This study examined standard and reduced rate treatments in terms of weed control, as determined by the time needed to hand weed the crop, as well as bell pepper growth and yield. We tested the herbicides commonly used in peppers: Devrinol®, Treflan®, Vapam®, or Prefar®.

Treflan appeared to provide the best weed control and bell pepper yields were generally highest on these plots. Devrinol treated plots had better weed control and thus lower hand weeding costs when 1.5 lbs/a was used compared to 2.0 lbs/a. Marketable yields at both harvests also responded positively to the 0.75X rate of Devrinol. Reducing the rates of Vapam or Prefar increased weed growth, and resulted in more time needed for hand weeding. Weeds were removed in all plots by hand weeding, but early competition appeared to reduce bell pepper yields.

Hand weeding time was less at the first hand weeding (approximately 4 weeks after transplanting) than the second hand weeding (3 weeks after the first hand weeding). Weed growth was suppressed by the herbicide treatments between the time of transplanting and the first hand weeding. Hand weeding appeared to

Complete Research
Reports Available
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disturb the herbicide layer and allowed weeds to escape control, and thus the increase in hand weeding time at the second hand weeding. An option that should be evaluated in the future is the use of directed application of either Paraquat® (restricted use pesticide) or Scythe®, which are both labeled for this use in peppers. This type of treatment would kill small weeds and leave the pre-emergent herbicide treated layer intact.

Additional pepper trials evaluated the use of halosulfuron for yellow nutsedge control and bell pepper tolerance. A single application of halosulfuron at 0.032 lb ai/a provided approximately 90% yellow nutsedge control at 45 days after treatment and about 65% control at the end of the season (150 days after treatment). This work will continue this year.

Genetic and Environmental Influences on Quantitative and Qualitative Expression of Capsaicin in Pepper Fruit

Molly Jahn, Assistant Professor, Department of Plant Breeding & Biometry, Cornell University

Peppers (*Capsicum*) are well known for their unique ability to produce capsaicin, a compound important to the vegetable, processing, and spice industries. In spite of its importance and the considerable effort that industry expends to monitor levels either to assure appropriate amounts or to assure its absence, the processes that govern the presence of this family of compounds are still not precisely defined, nor are they well controlled.

The objective of our work was to develop tools for breeders to use during selection of the *C* gene, to improve selection efficiency and accuracy. We have genetically mapped this gene to chromosome 2 in pepper, and have developed a population segregating for this gene to allow for the identification of genetic “tags” for this gene. We also mapped the genes that encode the

enzymes responsible for the biosynthesis of capsaicinoids (kindly provided by Dr. Mary O’Connell) in pepper placental tissue because these are likely to be genes that cause variability in capsaicin content of pepper fruit.

Finally, we have also constructed another *C. frutescens* x *C. annuum* population of at least 200 F₃ families that will be grown in Gilroy and in Ithaca this summer. Each F₃ family will be analyzed in both environments for pungency and DNA has already been extracted from the F₂ plants.

Our objective in this study is to identify the regions of the genome that contribute to variability in fruit pungency. If we are successful, we will be able to provide breeders with tools that will help them determine if they have selected the genes they want, whether they are selecting against or for pungency.

Weed Control Trials

Richard Smith, Monterey County Farm Advisor

Peppers are slow growing and compete poorly with weeds early in the growth cycle. The preemergent materials that are registered for use on peppers in California have some notable gaps in the weed spectrum that they control. For instance Devrinol® (napropamide) is weak on nightshades and little mallow, which are two key weeds in many pepper production areas. Dual Magnum® (s-metolachlor) is registered under a third party registration in New Mexico for use on chile peppers and provides excellent weed control for pepper growers there. The purpose of this proposed study was to evaluate the efficacy of preemergence weed control materials such as Dual Magnum, Authority® (sulfentrazone), Prowl® (pendimethalin) and Sandea® (halosulfuron) and to examine their potential as weed control materials for peppers in California.

Three trials were conducted in San Joaquin County and four in Monterey County on both direct seeded and transplanted peppers. Dual Magnum and Authority looked very promising in trials conducted in both San Joaquin and Monterey Counties at sites dominated by nightshade. Dual Magnum and Authority reduced hand-weeding times in one trial heavily infested with hairy nightshade. However, at sites dominated by other weeds such as purslane or burning nettle, Dual

Magnum and Authority did not provide additional weed control over the standard herbicide combination of Devrinol + Prefar® (bensulide). Two formulations of Prowl provided excellent control of purslane, barnyard grass and shepherdspurse. In addition, Prowl provided excellent crop safety. Sandea provided excellent suppression of yellow nutsedge with two sequential applications of the middle rate (0.032 lb a.i./A). Crop safety with this material was acceptable. Black plastic reduced hand-weeding times over the untreated check by 50% and provided a boost in total yield of peppers as well. Dual Magnum, Authority, Prowl and Sandea are not currently registered on peppers in California

Evaluation of Pepper Varieties for Resistance to *Phytophthora capsici*

*James P. Prince, Department of Biology
California State University, Fresno*

Goal. Our goal for last year's project was to evaluate currently available commercial pepper varieties for their resistance to various California isolates of *P. capsici*.

This necessitated (1) collecting fungal isolates from the field (and accumulating archival isolates for use as controls), (2) screening them on peppers in the greenhouse, and (3) testing peppers in the field.

Field fungal isolations. Diseased plants were collected from fields around Fresno, Gilroy, Hanford, Paso Robles, and Santa Maria. Diseased pieces of fruit, stem, and root were rinsed and placed onto PARPH plates. PARPH is "semi-selective" for *Phytophthora*, which means that it is supposed to only support the growth of *Phytophthora* and *Pythium*. We actually got growth of other material as well, probably a type of *Zygomycetes*. After the first couple of collecting trips, we realized that it was important to plate out the plant material as soon as possible, rather than storing it for a couple of days in the refrigerator, which seemed to increase our success at isolating non-*Phytophthora* fungi. We have obtained three *Phytophthora* isolates. Their identity is being doublechecked by plating them out with the two mating types, A1 and A2, and looking for sexual structures. One of our main goals for the upcoming summer is to obtain several more field isolates.