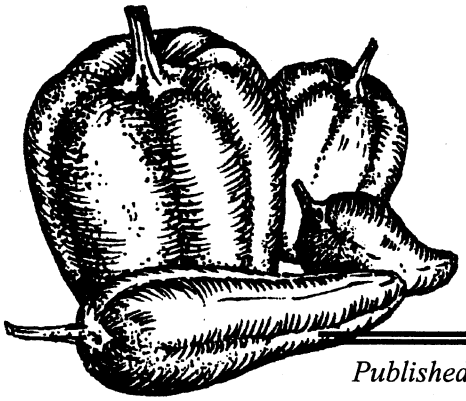

Pepper News

Published by the California Pepper Commission, 531-D North Alta Ave., Dinuba CA 93618
559/591-3925

April, 2006

18th International Pepper Conference

Glen Fischer, Saticoy Foods
Chairman, California Pepper Commission

This year California is hosting the 18th International Pepper Conference. The California Pepper Commission, along with the California Pepper Improvement Foundation, have joined together to organize this worthwhile event. The Conference will take place in Palm Springs on May 21st -23rd, 2006.The aim of the conference is to bring together those with an interest in the current status of pepper research, extension and technology. Topics of interest will include:

- ➜ Breeding and Genetics
- ➜ Horticultural Management and Production including production methods, cultural systems and sustainable approaches
- ➜ Integrated Pest Management including insect and disease management, biological control
- ➜ Post Harvest Issues including post harvest physiology and technology, economics, marketing and trade

Reports from all of the Commission sponsored projects will be provided. In addition to the symposium, a commercial field tour of the Coachella Valley will be conducted which will include a variety trial with thirty-six different varieties. All growers and processors are encouraged to attend. The registration rate is $325, but a rate of $275 will be offered through May 12th to California pepper industry members. To take advantage of this offer simply call the Commission office at (559) 591-3925 and talk with Ken Melban or Jerry Munson by May 12th.

Register by May 12th for the International Pepper Conference in Palm Springs

Biology and Control of Powdery Mildew of Pepper

Mike Coffey, UC Riverside

Powdery mildew of peppers is a potentially destructive disease. In mildew years it can lead to severe sunburn and total loss of affected fruit as occurred two years ago. Our research has focused on three main areas: fungicides, resistant varieties and basic biology of the pathogen and its host with a view to developing disease forecasting methods. In recent years more aggressive strains of the powdery mildew pathogen have appeared in pepper growing areas of California. Early and effective disease management is critical to avoid potentially epidemic outbreaks. However, because the pathogen is hidden for three weeks or more due to the long incubation time (latent period) in the host pepper plant this is difficult to achieve. Our research with fungicides has focused on those materials that show promise in disrupting the disease during this hidden but potentially deadly latent period. Several compounds are under investigation including Quintec and V-10118. We are also investigating the potential to control powdery mildew using resistance derived from wild pepper species. We have screened several hundred sources including some more advanced breeding lines and several lines appear to have near

immunity to the strain of powdery mildew we are using. There are mildew years such as 2003 and years such as 2005 when mildew was scarcely seen. This indicates that the environment, especially temperature and humidity, can have a profound effect on the development of powdery mildew disease. We have begun experiments to determine the influence of different temperatures and relative humidities on mildew development. Initial results indicate that higher temperatures may disrupt or slow down initial infection. In the real world fluctuations in temperature are continual and ever changing. Through studying and monitoring the influence of changing climatic conditions on mildew development we hope to develop approaches that will allow accurate disease forecasting that will more accurately tell us when and if to apply fungicides.

Preemergence Weed Control Trials in Peppers

Richard Smith and Michelle LeStrange, Farm Advisors Monterey and Tulare Counties, respect.

Weed control challenges for peppers grown without plastic continue to be significant. Devrinol, Prefar and Treflan are registered preemergence herbicides in peppers. Dual Magnum is registered under a 24C and provides good control of hairy nightshade (*Solanum sarrachoides*) and yellow nutsedge *(Cyperus esculentus)* which are not controlled by the other preemergent materials. Late season weed control is also an important issue in this crop. The objective of these studies was to examine at transplant and layby herbicide combinations for peppers that can provide long-term and economical weed control for peppers grown without plastic mulch. The herbicides tested included: Dual Magnum 7.62 (s-metolachlor), Goal Tender 4F (oxyfluorfen), Outlook 6.0 (dimethenamid), flumioxazin (Chateau) impregnated on fertilizer, and Dacthal 75W (DCPA). Trials were conducted in the Central Coast and Fresno County production districts. The Central Coast trial provided evidence that Goal Tender applied to shaped beds prior to transplanting (and subsequently not worked prior to transplanting) provided acceptable safety to the peppers and good weed control. This use pattern could provide an alternative "at planting" treatment and can provide weed control for the first 30 days following transplanting. Outlook was applied over-the-top in both trials, but was more damaging to the peppers in the Fresno trial. This material did not reduce yields in the Central Coast trial and should be further examined as a pretransplant and layby application. Both trials showed that flumioxazin impregnated on fertilizer has promise as a post transplant application on peppers. The Fresno trial showed that Dual Magnum, Outlook and Dacthal all provided good layby weed control. Dacthal is already registered for this use, but the Dual Magnum label would need to be adjusted to allow this use. In summary, these trials showed promise for developing a weed control system to provide early and late season weed control for peppers.

Insect Pest Management

John Trumble, UC Riverside

In early June pepper screening trials were started at the South Coast Research and Extension Center (SCREC) under the direction of Dr. John Trumble, Bill Carson, and Greg Kund from the University of California Riverside. The trials were composed of two phases. Phase one is a chemical screening process to examine the efficacy of current and new experimental compounds to control pepper pests. Phase two is the implementation of the most promising compounds into an IPM program which could be applied to a commercial operation. This season was the first year of the program and the primary focus was on controlling the pepper psyllid and worm insect damage.

Future trials will incorporate compounds for the control of pepper weevil. Phase two chemical screening trials examined Currior 40 SC, NNI 2302 150g ai/L EC, Agrimek 0.15 EC, Actara 25% WG, DPX-E2Y45 SC 200g/L, Belay 16 WFG, Oberon 2 SC, Knack, and Admire. The Belay material was applied via a chemigation one time. Oberon and Knack were sprayed three times. Admire was applied two times by chemigation. The other materials were sprayed on a weekly basis with a tractor-mounted boom sprayer at commercial rates. The rates and specific dates of applications can be found in the full report available through the Commission's office. The best suppression of

psyllids was with AgriMek, Actara, NNI 2302, and Oberon. The poorest control was with the low rate of Belay, and with Admire. The best control of pepper weevil adult and larval damage was with Actara and Admire. Actara is a good candidate for next year's IPM program trial.

Phase II IPM trials were also conducted at SCREC. A comprehensive insect pest management program was evaluated in an experimental planting of a commercial variety of peppers. Plants were scouted on a weekly basis to determine if pesticide applications were needed. Plants were sprayed as mentioned above. Nine strategies were used for controlling thrips, whiteflies, and tomato psyllid. This season we did account for the control of the pepper weevil. These rotational strategies were comprised of materials that are currently in use or likely to be registered in the near future. Sticky cards were placed at the edges of the field above the plant canopy to monitor pest pressure. This study generates the type of information preferred by EPA and CDFA when deciding on the merits of registration of new products.

The materials that were tested in various combinations were Admire 2F, Admire Pro, Oberon 2 SC, Xentari DF, S-1812 4EC, Venom 20 SG, and Purespray Oil. The rates, combinations, and specific dates of applications can be found in the full report. Purespray Oil plus Admire, and Oberon plus Admire Pro provided the best psyllid control. None of the treatments provided significant control of the pepper weevil or beet armyworm. Harvest yield data showed that there were no differences between any treatment for the number of marketable fruit. Future IPM studies will include stronger compounds for the control of pepper weevil and beet armyworm. We will also include an economic analysis of the different IPM regimens to determine which programs would potentially provide a greater economic return for the commercial pepper grower.

Breeding for CMV tolerance for bell peppers adapted for California production

Molly Jahn, Professor, Dept. of Plant Breeding, Cornell University

At the request of the CPIF/CPC, we revived our breeding program focused in the improvement of tolerance to cucumber mosaic virus resistance in bell peppers adapted for open field production in California. We have used 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 a selection from this source (CMR 3990); and C . *frutescens* 'BG2814-6'. At the direction of the CPIF, we are using 'Baron' as the recurrent parent in this phase of the breeding program. Our disease screening protocol involves a cotyledon stage mechanical inoculation followed by two or more subsequent inoculations on older leaves and rouguing of all symptomatic plants until after fruit set. Resistance or tolerance derived from both the *C. annuum* and the *C. frutescens* sources refers to the failure to develop symptoms. Although virus titer appears to be substantially reduced in tolerant genotypes relative to fully susceptible genotypes, virus is generally present at levels that are slightly 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 F_3 progeny screens in order to confirm the tolerance of F_2 plants used for backcrossing, since selected tolerant F2 plants occasionally give low percentages of tolerant offspring. We have virtually no escapes of susceptible check plants (a couple of plants out of many hundreds). We hypothesized that the relatively low numbers of resistant individuals from resistant F_2 plants may be due to some incompletely penetrant tolerance to the disease (i.e., the tolerance may be exhibited in the F_2 but may fail to be expressed in a genotypically similar plant). We also see incomplete penetrance of CMV tolerance in the *C. frutescens* source and occasionally in Perennial.

Bell When we received notice about the California Pepper Commission's renewed interest in CMV resistance, we already had a program in place for an early maturing red bell with CMV resistance for the Northeast. We were using King of the North and a selection from Early Red Sweet as recurrent parents. For this program, we used best material

from the original work with CalPep in the 1990s which was planted and re-screened for resistance. The variety Baron was crossed into both the CalPep and the Northeast populations. Selections from both populations were sent to Bob Heisey for testing and crossing as well.

Evaluation of new fungicides as potential management tools for Phytophthora crown rot on pepper plants

Dr. Michael E. Matheron, Extension Plant Pathologist and Professor, The University of Arizona

The oomycete pathogen, *Phytophthora capsici*, can cause extensive losses in pepper plantings. The first symptoms usually include a root and crown (stem) rot, which can be followed by an aerial blight of leaves, fruit, and stems in regions with frequent rainfall events. As with all *Phytophthora* species, water is a crucial factor in pathogen reproduction and subsequent disease development. Excessive soil moisture, either from irrigation or rainfall, stimulates production of sporangia and release of zoospores, the infective propagule of the pathogen.

Fungicides are an important component of a Phytophthora disease management system, when used in combination with other management practices such as crop rotation, raised beds, and water management. The number of fungicides available to pepper growers for management of *Phytophthora is* limited. Furthermore, populations of *P. capsici* in many growing areas have become resistant to one registered fungicide, Ridomil Gold (mefenoxam). There is a critical need for more fungicides to incorporate into an integrated disease management plan for peppers. The objective of the following study was to assess the ability of some fungicides active against other oomycete plant pathogens to control the development of Phytophthora root and crown rot on bell peppers when applied to soil. Naturally infested soil was collected from around diseased chile pepper plants within a field planting in southeastern Arizona and transported to a greenhouse at the Yuma Agricultural Center. Soil was thoroughly mixed, dispensed into a series of 1-pint capacity plastic pots, then a bell pepper seedling was transplanted into each pot. Each chemical treatment then was applied by drenching the soil within each of five containers with 200 ml of a solution of that compound, followed by a second application after one month. Two sets of control treatments were established: pepper plants grown either in untreated field soil or heat-sterilized field soil. A shallow container was placed under each pot and filled with water daily to maintain wet soil conditions that favor disease development. Plants were maintained in the greenhouse for the duration of the trial. The experiment was terminated after about two months. The following data were collected during or at the end of the experiment: i) time in days from initiation of the trial until a plant permanently wilted (duration of plant survival), and ii) fresh weight of plant shoots and roots. This experiment was conducted twice, with the initiation and termination dates of each trial as follows: first trial, Sep 26 to Dec 1; second trial, Oct 20 to Dec 13.

Disease severity in general was higher in the first trial, likely due to higher soil temperatures, compared to the second trial. In the first trial, untreated pepper plants were all dead after an average elapsed time of 5 days after planting into soil infested with *P. capsici.* In the same trial, no plants died after 66 days when the soil was treated with Ranman (cyazofamid), V-10161 (fluopicolide), and Reason (fenamidone) + Previcur Flex (propamocarb). Additionally, only one out of five pepper plants died when treated with Omega (fluazinam), NOA-446510 (mandipropamid) and AgriFos (mono- and di-potassium salts of phosphorous acid). For all of these treatments, the duration of plant survival and fresh weight of plant shoots and roots did not differ significantly from plants grown in sterilized soil. In comparison, plants treated with Ridomil Gold did differ significantly from those grown in sterilized soil with respect to survival and growth, suggesting that the population of *P. capsici* in this soil was insensitive to this fungicide. In the second trial, where disease severity was less intense compared to the first trial, untreated pepper plants were all dead in an average elapsed time of 13 days after planting in soil infested with the pathogen. On the other hand, no plants died after 54 days when soil was treated with an appropriate rate of Ranman, V-10161, Reason + Previcur Flex, NOA-446510, AgriFos, TM-459, and ProPhyt (potassium phosphite). Furthermore, only one out of