

Layby applications to direct seeded peppers were also safe (i.e. applied post thinning). Applications of Dual Magnum at planting were mixed however. One grower on sandy loam soils observed stunting of the peppers when the material was applied preplant and incorporated with water. Another grower that applied Dual Magnum in the same way, but on a clay loam soil with 1.5% organic matter did not see any problem with this application. In summary, caution should be exercised with preplant applications of Dual Magnum to direct seeded peppers on light soil. Dual Magnum provided good weed control of problematic weeds in pepper production fields.

Background Dual Magnum received a 24C registration in California through the efforts of the California Pepper Commission and was first available for growers to use in the 2002 growing season. Dual Magnum is registered in other

states, but there were concerns regarding its general safety for use on peppers. For instance, Dual 8E was originally registered in New Mexico for direct seeded peppers, but its use pattern was changed to only include its use on transplanted peppers due to injury to the peppers in some situations (Jill Schroeder, New Mexico State University, personal communication). This follow-up survey was conducted of growers that used Dual Magnum in 2002 to determine if there were any problems with its use.

Methods A list of 12 growers was obtained from the Pepper Commission that had requested the waiver of liability for the use of Dual Magnum in 2002. A phone survey was conducted of nine of these growers asking them questions regarding their use of Dual Magnum and asking them to identify any problems or concerns that they had regarding its use and safety on peppers. The results were summarized:

Table 1. Summary of Survey Responses

Survey Questions:	Summary of Responses	Comments:
1. Acres of seeded peppers grown	295 acres	Two growers applied at layby; one at planting with no problem*; one at planting with stunting**
2. Acres of transplanted peppers grown	415 acres	Most applied at or before transplanting; one three weeks post transplanting
3. Rates of Dual Magnum	1.0-1.6 pt/A; mean = 1.35	
4. Soil types	Sandy to clay loams	
5. Safety of herbicide on pepper stand and growth	8 with good safety; 1 site with stunted seedlings	The site with stunting grew out of it later in the season
6. Any negative effects on yield	8 with no negative effect; one site unsure	
7. Weeds controlled	Hairy and black nightshades, yellow nutsedge and purslane	The nightshade control was very good; it was helpful on nutgrass
8. Weeds not controlled	None mentioned	
9. Did Dual Magnum save you money	7 yes; one probably	Saved on hand weeding; one site it saved on a cultivation
10. Would you use it on additional acres in 2003?	8 yes; 4 mentioned significant acreage increases	Most were very positive on its use

* clay loam soil, 1.5% organic matter

** sandy loam soil, low organic matter



Pepper News

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Annual Report Issue

Section 18 on Rally® Renewed for 2003

In last year's newsletter we reported that it appeared the Section 18 on Rally would be approved for another year. However, as most of you have realized by now, the Section 18 on Rally was not renewed in August, 2002. The basis for this non-renewal was that a new product, Quadris, had received a full registration for control of powdery mildew on peppers. Under the guidelines of a Section 18, the following criteria must be established: 1) no effective pesticides are available; 2) no economically or environmentally feasible alternative practices which provide adequate control are available; and, 3) the situation will cause significant economic loss.

When California's Department of Pesticide Registration (CDPR) reviewed the application for the Rally Section 18, they decided the full registration on Quadris would prevent them from granting the Rally 18. The Commission reviewed last year's efficacy of Quadris and decided at the annual meeting in February to pursue a Section 18 for Rally once again. The application cited some of the problems growers had without Rally last year, as well as the fact

that the Quadris label calls for an alternative compound. Taking this information into consideration, the Environmental Protection Agency (EPA) and CDPR have agreed to issue another Section 18 for Rally as of June 27th.

The application and approval was somewhat altered from previous years, with the language changed to a very prescriptive label. The label requires sulfur to be used until temperatures are forecast to exceed 90°, when an application of Quadris, Cabrio or Flint must first be applied before Rally can be used. If more control is needed, another application of Quadris,

Cabrio or Flint may be applied, followed with a second application of Rally. Your local County Agriculture Commissioner should have the information on the Section 18 by the time you get this newsletter.

Evaluation of Pepper Varieties for Resistance to *Phytophthora capsici*"

James P. Prince, Dept. of Biology, CSU Fresno

Introduction: Phytophthora root and stem rot of pepper (PRR), caused by *Phytophthora capsici*, is one of the most serious fungal diseases of

Dual Magnum® is still available to bell pepper growers throughout the State (see pages 5 & 6). Contact the Commission office for more information.

pepper. Symptoms include root rot, lesions on the stem, leaf and fruit, wilting, stunting, and necrosis. Disease control has focused on three main avenues: (1) cultural and irrigation practices, (2) fungicides, and (3) the use of cultivars with genetic resistance to the pathogen. We are interested in the response of pepper cultivars to different isolates of the pathogen.

Project Goals: (1) To amass a collection of at least 40 *P. capsici* isolates currently in California pepper fields. (2) To continue to evaluate currently available commercial pepper varieties for their resistance to these California *P. capsici* isolates.

What we did: We collected diseased pepper tissue from the field in several areas around California (primarily Central Valley, Santa Maria, Paso Robles, and Gilroy). Diseased tissue was placed on selective agar plates that allowed the growth of *Phytophthora*. Sometimes several rounds of purification were required to get *Phytophthora* alone. Zoospores (motile, asexual spores) harvested from the fungal cultures were used to inoculate replicates of seedlings of various pepper genotypes in the greenhouse. Pepper genotypes were chosen either for their potential for resistance or as susceptible checks (to make sure our fungal isolates were virulent). Disease scores based on a visual screening method were averaged over all replicates for each genotype:fungal isolate combination. Scores ranged from 0 (no symptoms) to 5 (death). Plants with average scores of 0-2 were considered resistant.

Results: We have collected approximately 60 fungal isolates from different areas around California, with the exception of Southern California. These isolates are in various stages of purity, and we are working on purification of all of them. We obtained additional isolates

from Dr. Tom Day of Sakata Seeds and from Dr. Mike Coffey of UC Riverside. Eleven of these isolates have been screened against our different pepper genotypes. Results vary by pepper:fungal isolate combination, but some generalizations can be drawn. Pepper lines Bell POC, Cayenne 192, NuMex Joe E Parker, and Jupiter were all highly susceptible, exhibiting mean scores between 2.53 and 5 to all *Phytophthora* isolates tested. Pepper lines Cayenne 193, Criollo de Morelos, Fidel, Paladin, and PI201234 all showed low to no susceptibility with average scores ranging from 0 to 1.52. The other pepper genotypes, Cayenne 194 and Psp-11 had mixed results depending upon the fungal isolate used.

Conclusion: Clearly there are differences in the level of fungal resistance in the pepper genotypes examined. We found some peppers that were highly resistance and others that were not. It is good news that we have not as yet found fungal isolates that overcome resistance in all pepper genotypes. In related work, we are examining the genetic basis of resistance, and mapping the locations of resistance genes for future marker-assisted selection. In work funded by the California Pepper Commission, we are checking our collection of isolates for resistance to the fungicide Ridomil (metalaxyl).

Improving *Phytophthora* Tolerance in an Open-pollinated Bell Variety for California

Molly Jahn, Dept. of Plant Breeding, Cornell University

In contrast to many problems in pepper, resistance to *Phytophthora capsici* has received considerable attention over the last several decades. Hundreds of papers have been published in the last thirty years detailing many aspects of the biology, genetics and ecology of the interaction between this pathogen and

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 Vice-Chairman Gilroy 408/848-6373	3	Dan Fiorio Gilroy 408/842-1809	
Bob Giampaoli Le Grand 209/389-4576	4	Nick Maddalena Chowchilla 559/665-2403	
Richard Bradford Heber 760/413-2696	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
Daniel Brotslaw Turlock 209/656-5821	Dehydrated Chili Peppers	Vacancy
Glen Fischer Chairman Saticoy 805/647-5266	"Other" Pepper Processing	Vacancy
Tim Baloian Fresno 559/485-9200	Fresh Pepper Handler	Edward Chell Camarillo 805/987-7702
Robert Heisey Gilroy 408/848-4344	Pepper Seed Handler	Ken Owens Dixon 707/693-6815

Public Representatives

Dave Nirenberg Camarillo 805/484-2692	Vacancy
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Fungicide Test in Bell Peppers

Jim Campbell, Crop Science Services

Two tests of fungicides were put out in the southern Salinas Valley to test safety and efficacy of newly registered Quadris and Flint in comparison with Rally and Cabrio and other mildew materials. Commercial ground application equipment was used to deliver 50 to 75 GPA. At both locations moderate to severe disease pressure occurred. However, with cooler Fall weather conditions, only light defoliation and fruit sunburn occurred.

After two applications, Rally at 4 oz per acre provided the best mildew control followed by Quadris at 6.2 fl. oz. and Cabrio at 16 oz. Control with Flint at 2 oz per acre was disappointing. Among the softer materials, at the rates tested, Messenger, Kaligreen, Serenade only provided about 20% control of mildew with two applications. Most likely these softer materials would need four or more applications to achieve a commercially acceptable level of control. At these sites there were no conclusive yield differences, but Rally consistently reduced sunburn, and its better mildew control should mean less loss due to sun burn.

Grower's Use of Dual Magnum in 2002: Follow-up Survey

Richard Smith, Farm Advisor, Monterey County

Summary This report summarizes interviews with nine growers that utilized Dual Magnum for weed control in 2002. The results indicate that growers were overwhelmingly satisfied with the use of Dual Magnum. It provided a tool to control problematic weed species such as Hairy and Black nightshades and yellow nutsedge. It was safe for use preplant incorporated and post plant on transplanted peppers.

Capsicum. Resistant varieties are available that derive from several different sources of resistance, but in recent years a general consensus has emerged that *C. annuum* Criollos de Morelos 334 is one of the best sources, if not the best source, of available resistance. Resistance is due to a major gene together with other genes that show quantitative or additive inheritance, that is, each gene has a small incremental effect towards resistance. With this support, we began about 2 years ago to improve the level of tolerance/resistance to *Phytophthora* in a set of open-pollinated varieties selected by the CPIF for use as recurrent parents in a backcross breeding program.

We are using standard procedures to backcross resistance from the leading sources including a commercial bell variety, Paladin (Rogers/Syngenta), into open-pollinated types useful in California. The cultures we use in our screens were isolated from commercial production fields in California. The California Pepper Improvement Foundation selected the 2 varieties we are using as the recurrent (target type) parents: ECW300 and Yolo B. At their request we will be adding two more recurrent parents, Excaliber and Baron. The end products of our breeding program should be a series of open-pollinated breeding lines suitable for California production that carry improved levels of tolerance to *Phytophthora*.

Results of our most recent F₂ screen conducted winter 2002-03 are as follows:

F ₂ Line	# of Susceptible	Total #Plants
CW300BC1F2	166	198
CW300BC1F2	145	166
YoloBBC1F2	176	237
YoloBBC1F2	190	234

2002 Weed Control Studies in Peppers

Richard Smith and Bob Mullen, Farm Advisors

These trials were initiated to examine the use of Goal as a weed control treatment applied to shaped beds prior to transplanting peppers. Currently the Goal 2XL label allows for an application of up to 2 pints/A 30 days prior to transplanting peppers for fallow bed weed control. However, the beds must be worked to a depth of 2.5 inches prior to transplanting the peppers. Working the bed disturbs the layer of Goal, inactivates it and reduces any potential phytotoxicity to the peppers.

Our objective was to modify this application technique by not working the beds prior to transplanting, thereby leaving the Goal barrier intact, and evaluate subsequent weed control and crop safety. We evaluated Goal 2XL and a new formulation Goal 4F which may potentially have less lift off risk than the 2XL formulation. This use pattern of Goal was of interest because it potentially would provide an additional weed control option for pepper growers, but also because it provides weed control against troublesome weeds (e.g. Malva) not controlled by any of the other preemergence materials.

Three trials were conducted in 2002 in which two application rates and timings of Goal were examined. Goal provided good weed control and had acceptable phytotoxicity at the 2 pint rate 30 days prior to transplanting. However, weed control improved with application timing closer to transplanting (i.e. 15 days), although phytotoxicity also increased.

We did not observe reduced phytotoxicity with the Goal 4F formulation, however this formulation was tested in only one trial in which the material was applied 4 days prior to

transplanting. The observed phytotoxicity caused by Goal was only seen on the leaves and appeared to be caused by lift off of Goal rather than burning of the stem at the soil line.

In one study, the weed control provided by Goal lasted 4 to 6 weeks following transplanting. There was no negative impact on yield by Goal detected in any of these trials. These studies are preliminary and there are many questions regarding this technique: 1) impact of applying or not applying water to incorporate the Goal application, 2) the impact of bringing up untreated soil by the planting shoe during transplanting, and 3) the impact on yield of the phytotoxicity observed on the plants. This weed control technique will be further examined in 2003.

California Pepper Commission 2002-03 Financial Report

The accompanying Financial Report shows that the Commission continues to be in excellent financial shape, with the income from marketed peppers in California again exceeding the Commission's rather conservative budget. Over the past eleven 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 \$81,000 at the \$.30 per ton rate. However, the actual tonnage is usually considerably higher than that, and last year was no exception.

Last year's total income wasn't as high as in some years, partly because the Commission was assessing at the rate of \$.30 per ton in lieu of the previous \$.50/ton rate. However, the income was still about 37% over the budget, thus bringing in a \$29,700 surplus, and in addition, the Commission earned over \$9,000 in interest

on its reserve funds. At this year's annual meeting, the Commissioners agreed to keep the lower assessment rate, a move partially prompted by the expected carry-over into the 2003-04 year of just under \$200,000.

The Commission's books are audited annually by an independent Certified Public Accountancy firm, and any pepper industry member wanting a copy of said audit may apply to the Commission office. If you have any questions please call Jerry Munson, Commission Manager, or Ken Melban, Assistant Manager at (559) 591-3925.

Financial Report

Fiscal Year: May 1, 2002 thru April 30, 2003

<i>Account Name</i>	<i>Amount</i>
INCOME	
Carry-over from 2001-02	\$195,509
Assessment Income, 2002-03	110,744
Interest Income	<u>9,868</u>
	\$316,121
EXPENDITURES	
Management Services	\$33,120
Legal Counsel	726
Audits	1,590
Office Supplies	850
Telephone	1,202
Postage	730
Travel & Mileage	549
Meetings	884
Insurance	384
Marketing Branch, CDFA	7,549
Production Research	58,434
California Minor Crops Council	5,000
Chemical Research	<u>7,806</u>
Total Expenditures	\$118,824
Carry-over to 2003-04	<u>197,297</u>
Total Expenses & Reserve	\$316,121