UNIVERSITY OF CALIFORNIA COOPERATIVE EXTENSION

Kearney Plant Protection Group

PLANT PROTECTION QUARTERLY

July 1995 Volume 5, Number 3

This newsletter is published by the University of California Kearney Plant Protection Group and the Statewide IPM Project. It is intended to provide UC DANR personnel with timely information on pest management research and educational activities. Further information on material presented herein can be obtained by contacting the individual author(s). Farm Advisors and Specialists may reproduce any portion of this publication for their newsletters, giving proper credit to individual authors.

James J. Stapleton, Charles G. Summers, Beth L. Teviotdale, Peter B. Goodell, Timothy S. Prather
Editors

IN THIS ISSUE

ARTICLES

DETERMINING THE ECONOMIC IMPACT OF WEED CONTROL IN ICEBERG LETTUCE USING VARIED RATES OF KERB IN COMBINATION WITH HAND HOEING

Timothy S. Prather, U. C. Kearney Ag Center and Kurt Hembree, UCCE Fresno County

Abstract

Few herbicides are registered for use in lettuce and loss of Kerb (pronamide) would leave growers with even fewer options. The objective of this study was to calculate the economic benefit from using Kerb to control weeds. The study used several rates of Kerb in combination with hand hoeing, and computed costs associated with these weed control operations. The two main weeds were shepherdspurse and common purslane. There were 8 shepherdspurse per foot of row and 2 common purslane per foot of row. When all costs were considered, the most economical control was $96/acre for 2 lbs of Kerb applied in 5 inch bands over each lettuce row. The 4 lbs of Kerb rate was equal in cost to hand hoeing ($106/acre). Broadcast applications of Kerb were the least economical at $137 to $167/acre. Additional studies are planned at higher weed populations to gather more economic data.

Procedures

The study was conducted at two sites in Salinas, California which were established in May and July, 1994. Weeds were sparse at the first site (May), so only procedures and results from the July study will be discussed. The study contained seven treatments, replicated four times in a randomized complete block design. Plots were four, 40 inch wide beds by 50 feet in length. Treatments included: (1) pronamide broadcast applied at 2 lb ai/acre, (2) pronamide broadcast applied at 1 lb ai/acre, (3) pronamide banded (two 5" bands) at 2 lb ai/acre, (4) pronamide banded (two 5" bands) at 1 lb ai/acre, and (6) no pronamide plus hand weeding during thinning and as needed during the season. The herbicide was applied immediately following planting and incorporated with overhead sprinkler irrigation the following day. Herbicide was applied using a CO_2 back-pack sprayer and hand-held boom.

Each site was cultivated as per normal field operations. Farm laborers supplied by the grower observed during thinning and weeding to determine time required to thin and/or hoe each plot. Data collected included plant stand counts prior to thinning and hand weeding, time required to thin lettuce and time required to hand hoe weeds during the season. Yield data were not obtained because the plots were unintentionally harvested prior to measurement. All data were analyzed using analysis of variance and significant differences were determined at the 5% level of probability.

Results

Lettuce stand counts made one week prior to thinning and removal of weeds showed no treatment difference in the number of lettuce plants per foot of row. Lettuce appeared to be vigorous and uniform throughout the trial area. Shepherdspurse and common purslane were the primary weeds present. Pronamide applied at of 2 lb ai/acre (broadcast) controlled shepherdspurse better than pronamide at 0.75 lb ai/acre (banded) and the untreated control (Figure 1). There were no differences between treatments receiving banded rates of pronamide (1 and 2 lb ai/acre) and 2 lb ai/acre broadcast. Common purslane numbers were reduced by at least 50% in all pronamide treated plots compared to the untreated control (Figure 2).

Plots that had pronamide applied at rates of 1 or 2 lbs ai/acre banded or broadcast, took less time to thin than the untreated control (data not shown). Based on an average cost of labor contracted at $6.80/hr, it cost $42/acre to thin and weed plots receiving a broadcast rate of pronamide of 2 lb ai/acre, compared to the untreated control which cost $71/acre (Figure 3). Pronamide banded at 1 and 2 lb ai/acre resulted in thinning and weeding costs of $57 and $54/acre, respectively (Figure 3).

Most weeds were controlled during the thinning process and weed counts made three weeks later detected no difference among treatments (data not shown). Although differences in weed densities were not detected following thinning, the time required to remove the surviving weeds in plots treated with pronamide at 0.75 lb ai/acre (banded) or the untreated control took at least 2.5 hrs/acre longer than all other pronamide treatments (Figure 4). Plots treated with pronamide 1 lb ai/acre (banded) cost the least to hand weed ($15/acre), compared to the untreated control which cost as much as $35/acre (Figure 5).

Pronamide applied at 1 lb ai/acre in two 5" bands followed by thinning and hand weeding provided the most economical control of weeds ($96/acre, excluding cultivation costs) (Figure 6). Furthermore, the reduced time spent thinning and hand weeding this treatment made up for the cost of herbicide application, resulting in a net savings of $10/acre over the plots that were only hand weeded. At shepherdspurse densities of 5.3 and common purslane densities of 0.3 plants per foot of row, pronamide banded at 2 lb ai/acre was equally cost effective to hand weeding alone. The additional cost of treating the entire bed with a broadcast application of pronamide of 1 and 2 lb ai/acre resulted in the least cost effective method of control ($137 and $167/acre, respectively). Additional experiments are planned to obtain economic data for fields infested with higher weed densities.

(Figure not available)

Figure 1. Shepherdspurse density prior to thinning (plants/ft of row).

(Figure not available)

Figure 2. Common purslane density prior to thinning (plants/ft of row).

(Figure not available)

Figure 3. Hand thinning and weed removal cost ($/acre).

(Figure not available)

Figure 4. Time required to hand weed three weeks after thinning (hrs/acre).

(Figure not available)

Figure 5. Hand weeding cost three weeks after thinning ($/acre).

(Figure not available)

Figure 6. Total weed control costs excluding cultivation ($/acre).

PREDICTING PHENOLOGICAL DEVELOPMENT OF FIVE WEED SPECIES USING DEGREE DAYS

Timothy S. Prather, U. C. Kearney Ag Center

Abstract

Accumulated degree-days were used to predict weed emergence and phenological development. Five species, prostrate pigweed, redroot pigweed, common purslane, black nightshade and large crabgrass, were used in the study. Prostrate pigweed emerged faster than all other species, followed by redroot pigweed. The remaining species then emerged at about the same time. Prostrate pigweed and common purslane, both with prostrate growth habits, grew fastest and black nightshade was the slowest growing species of the group. Post-emergent weed control procedures could be timed to control the maximum number of weed species within a given emergence group. Timing weed control procedures to degree day models potentially could improve control efficiency.

Introduction

Post-emergent weed control could be timed to emergence of weed species that have similar emergence patterns. Timing control practices to weed emergence could decrease weed control operations by controlling the greatest number of species possible with each operation. For example, I observed an orchard after Roundup was applied to control common purslane in the 2 to 4 leaf stage. Large crabgrass emerged two to three days after the application, escaping herbicidal control. Delaying the application would have allowed the grower to control both species at the same time.

Degree-day models could be used to predict emergence and growth of weeds. Keeley and Thullen (1993) developed growth degree-day models for several weed species in cotton. There have been several experiments recently that focused on developing degree-day models and lower temperature thresholds for weeds (Gay et al., 1991; Hsu et al., 1985; McGiffen and Masiunas, 1992; Weise and Binning, 1987). The objective of this preliminary study was to develop growth degree-day models for redroot pigweed (*Amaranthus retroflexus* L.), prostrate pigweed (*Amaranthus blitoides* S. Wats.), common purslane (*Portulaca oleracea* L.), large crabgrass (*Digitaria sanguinalis* (L.) Scop.) and black nightshade (*Solanum nigrum* L.).

Procedures

Seeds were planted in the field in plots measuring 1m x 1m on a rectangular grid with plant-to-plant distances of 15 x 20 cm. As it emerged, each plant was given a unique code number, written on a small, plastic marker, to identify it through its development. The study was established on June 28 and 29, 1994. Plots were watered three times each week. Air temperature was recorded from the CIMIS weather station at Kearney Agricultural Center, Parlier, CA.

Data recorded included emergence date, date of first true leaf, number of leaves, number of branches, and flowering date. Data were taken 5 days per week. Degree days were calculated using the sine method found in University of California's DDU (1996) computer program. The experiment was established as a randomized complete design with seven treatments (weed species) and six blocks.

Results

Prostrate pigweed emerged first at 400 degree days, followed by redroot pigweed at 700 degree days (Figure 1). Large crabgrass, black nightshade and common purslane took the longest to emerge, requiring in excess of 800 degree day (Figure 1). The emergence pattern for these species shows three groups, prostrate pigweed and redroot pigweed as single member groups and than common purslane, black nightshade and large crabgrass as a third group.

Prostrate pigweed and large crabgrass grew fastest, as shown by the rate of leaf production (Figure 2). Common purslane and redroot pigweed produced leaves at an intermediate rate (Figure 2). Black nightshade produced leaves at the lowest rate of the five species.

All species, except black nightshade, began to flower between 600 and 670 degree days. Black nightshade did not begin flowering until 840 degree days. Keeley and Thullen (1993) reported black nightshade flowering at 820 degree days, demonstrating good correlation between the studies for black nightshade.

Conclusions

These results are preliminary but demonstrate the potential for using post-emergent weed control activities timed to emergence and plant development. Points to consider are: 1) where possible, delay weed control until all weeds in an emergence group emerge to prevent the need for additional weed control procedures, and 2) measure growth rates to ensure that some members of an emergence group will not grow too quickly, rendering timing of control for the entire group ineffective because one species out-grows the weed control procedure.

Literature Cited

1. Gay, C., F. Corbineau and D. Come. 1991. Effects of temperature and O_2 on seed germination and seedling growth in sunflower (*Helianthus annuus* L.). Environmental and Experimental Botany 31(2):193-200.

2. Hsu, F.H., C.J. Nelson and A.G. Matches. 1985. Temperature effects on germination of perennial warm-season forage grasses. Crop Science 25:215-220.

3. Keeley, P.E. and R.J. Thullen. 1993. Weeds in cotton: their biology, ecology and control. US Department of Agriculture, Shafter. 35 pages.

4. McGiffen, M.E., Jr., and J.B. Masiunas. 1992. Prediction of black and eastern black nightshade growth using degree-days. Weed Science 40:86-89.

5. Weise, A.M., and L.K. Binning. 1987. Calculating the threshold temperature of development for weeds. Weed Science 35:177-179.

(Figure not available)

Figure 1. Emergence of weeds based on degree day accumulation.

(Figure not available)

Figure 2. Rate of leaf production of each weed species.

(Figure not available)

Figure 3. Degree day flowering schedule.

ABSTRACTS

36TH ANNUAL ENTOMOLOGY CONFERENCE, UC RIVERSIDE, March 29, 1995

Predicting the Developmental Period of Citrus Cutworm using Degree-Day Units. *G.H. Montez and E.E. Grafton-Cardwell, U.C. Kearney Ag Center*

The Citrus Cutworm, *Egira (Xylomyges) curialis* Grote can cause significant damage to oranges, lemons and plums in the San Joaquin Valley of California. Larval feeding can result in damaged or destroyed buds and fruit, and late season feeding will result in scarred fruit. Traditionally, economic control of the citrus cutworm is achieved through the use of insecticides applied just prior to bloom until the larvae pupate in May. The use of organophosphate or carbamate insecticides to control citrus cutworm can have an adverse effect on natural enemies of other pests, especially California red scale. To minimize this effect, many growers are turning to insecticides using *Bacillus thuringiensis* (Bt) as the active ingredient. These insecticides require more accurate timing in order to get the best efficacy because older cutworm larvae are less likely to be killed than younger ones. Degree-day units have been successfully used for a wide variety of insect pests and in many agricultural systems for just this purpose - accurate timing of control measures, whether chemical, biological or cultural.

Cutworm development is dependent on temperature. The developmental rate can be expressed using degree-days. Degree-day units (°D) are defined as the average daily temperature minus the developmental threshold for an insect species. The lowest temperature that an insect can still survive and grow at is the lower developmental threshold. On days that are cooler than this, the insect still lives but does not grow. Insects can also have an upper developmental threshold, which means that when the weather is too warm the insect may not necessarily die but may shut down metabolically. Degree-day accumulation for citrus cutworm begins when a peak of male adult capture occurs. From this zero point, the model forecasts the point in time where a majority of larvae are of a certain stage; i.e. egg hatch, first molt, etc. To determine this peak, pheromone traps are set out beginning in December, and maintained through the end of the flight. The other critical piece of information is the daily maximum and minimum temperatures (T_{max} and T_{min}). This data can be

obtained in a variety of ways, preferably through the use of a temperature recording device or biophenometer placed directly in the field.
To correlate the basic degree-day model to field conditions, fifteen orange groves in Tulare County, California were chosen as sites for citrus cutworm monitoring. Of the fifteen sites, seven were equipped with two-channel temperature recorders, one channel measuring ambient air temperature and one measuring soil temperatures at a depth of six inches. Pheromone traps were placed in each site to monitor adult activity, and larval densities were recorded using black beating sheets. The sites were visited twice weekly over a sixteen week period.

Through laboratory studies, the lower developmental threshold (T_L) has been calculated as approximately 9.5°C (49 ^oF). No upper threshold has been established. Laboratory rearing data show that citrus cutworm requires approximately 120 °D to develop from a newly laid egg through the first instar, and 180 °D to progress through the second instar. These are the target stages for a Bt application, as the larvae are most vulnerable to the Bt toxin. Assuming that egg laying peaks shortly after the adult trap capture peaks, degree-day units accumulated from this point will give an indication of when larvae have hatched but not yet progressed through the third instar. The point of the degree-day model is that the grower can identify the peak male flight and have time to prepare an insecticide application with exact timing *if necessary*. To correlate the basic degree-day model to field conditions in 1995, 29 orange groves in the eastern San Joaquin Valley were chosen as sites for citrus cutworm monitoring. Pheromone traps were placed in each site to monitor adult activity and larval densities were recorded using black beating sheets. Orchard temperatures were monitored using recording thermometers. In the orchards studied, the degree-day interval from peak moth capture to peak larval capture ranged from 120 ^oD to 180 ^oD, which is very close to the predicted values. Therefore, accurate spray timing would fall in a window of 100 ^oD to 180 ^oD after the peak moth flight.

<u>Integrated Pest Management in Citrus in the San Joaquin Valley - 1994 Field Season</u>. *Beth Grafton-Cardwell, U. C. Kearney Ag Center*

Citrus thrips and California red scale continue to be the key pests driving pesticide use by citrus growers in the San Joaquin Valley. During 1994, we sampled 12 commercial citrus orchards for major pests and beneficials. Six of the growers utilized a broad spectrum pesticide program (Carzol, Cygon, Baythroid, Supracide, Sevin and Lorsban) to control worms, thrips and scale. In the other six sites, growers depended upon a combination of softer pesticides (Veratran, Dipel, oil, Agri-mek) and natural enemies to control their pests.

In 1994, growers using broad spectrum pesticides for control of citrus thrips (Carzol, Cygon and Baythroid) applied sprays soon after petal fall at the end of April. In all cases, citrus thrips densities were at or above the threshold of 5% of the fruit infested with immatures just after petal fall. One to two applications of pesticides were made in each of these orchards over an 8 week period. In most of the orchards, these applications were successful in keeping the citrus thrips populations low. In one site, the citrus thrips population was not controlled by an application of Carzol followed by an application of Cygon, suggesting that the citrus thrips have developed resistance in this location. Fruit scarring damage ranged from 0-1.4% in four sites where citrus thrips densities remained low. Fruit scarring damage ranged from 4.7-24.9% in two sites where citrus thrips populations were high for more than one week during the season. Predatory mite densities were low in all of these blocks. Four of the six sites experienced increased citrus red mite densities after sprays were applied.

In the blocks where growers were using softer pesticides (Veratran, Agri-mek) for citrus thrips control, fewer applications were made (9 sprays in the broad spectrum sites versus 5 sprays in the selective sites). Additionally, these growers tended to wait until they had higher densities of citrus thrips before they applied the pesticides. This is because Veratran and Agri-mek must be ingested by immature citrus thrips to have the greatest effect and so they must be carefully timed. Predatory mites were abundant in these blocks except where Agri-mek was used. Thus, Agri-mek is only moderately selective. However, Agri-mek is applied with a small amount of oil and it may be the oil that is affecting predatory mite development. Fruit scarring in these six sites ranged from 0.5 to 6.9%. Citrus red mites did not increase after Veratran and Agri-mek sprays.

All 12 orchards were sampled for California red scale and yellow scale using pheromone traps that catch males and by sampling twigs and fruit for scale infestation. In the broad spectrum sites, we found 0-2% scale infestation of fruit and four sites were sprayed by the growers. Five of the selective sites had releases of *Aphytis* wasps, which prefer to parasitize female scale, and so male scale densities (peak of 5,000-25,000 scale per week) were much higher than the broad spectrum locations (peak of 200-4,000 scale per week). Only one of the selective sites had an oil application. The selective sites had 0-19% scale infested fruit in August, however by October the infestation of fruit had declined to 0-11% and parasitism of that scale was as high as 78%. Thus, the natural enemies successfully killed the majority of scale infesting fruit in these blocks.

All 12 orchards were surveyed for citricola scale using a presence-absence sampling method. Citricola scale are very sensitive to organophosphate and carbamate insecticides. Thus, we have not seen citricola in the orchards treated regularly with broad spectrum pesticides. However, in five of the six selective pesticide orchards we did find citricola scale. A combination of a cool spring, which favors citricola scale, and the absence of broad spectrum pesticides in these sites for 3-5 years resulted in this buildup. The only selective pesticide available for control of citricola is oil; however, oil is only moderately effective.

THE AMERICAN PHYTOPATHOLOGICAL SOCIETY, Pacific Division, Jackson, WY, June, 1995

Antifungal Activity of Certain Cruciferous Amendments When Combined with Soil Heating for Biofumigation.
J. J. Stapleton, R. A. Duncan, and C. Thomassian, U.C. Kearney Ag Center

Combining cabbage amendment with soil heating (solarization) is a nonchemical approach for biofumigation which is known to improve the control of soilborne pathogens. Other cruciferous soil amendments also are under increased investigation regarding their potential for soil disinfestation, primarily because of their constitutive production of glucosinolates. These amendments have shown moderate antifungal activity, but it usually does not approach that of synthesized soil fumigant chemicals. *In vitro* amendment of soil with cruciferous plants, including black mustard, bok choy, broccoli, cabbage, cauliflower, and wild radish, reduced germination of *Pythium ultimum* by 52-91% and of *Sclerotium rolfsii* by 2-65% ($P<0.05$) over the nontreated control after 7 days in incubated soil. Addition of a sublethal, diurnal heating regime (38 C max/27 C min) to the 7 day incubation period reduced germination of *P. ultimum* and of *S. rolfsii* by 97-100% and 87-100%, respectively.

Ineffectiveness of Bloom Sprays to Control the Summer Bunch Rot Complex of Wine Grapes. *R. A. Duncan, J. J. Stapleton, J. C. Broome, G. M. Leavitt, J. J. Marois, K. M. Kelley, and T. Martin-Duvall, UCCE Sacramento Co., U.C. Kearney Ag Center, UCCE Madera Co., U. C. Davis, UCCE Stanislaus Co.,*

The summer bunch rot complex occurs in arid climates and involves several genera of fungi, yeasts, and bacteria including *Botrytis, Aspergillus, Penicillium, Rhizopus* and *Acetobacter*. Bloom sprays of iprodione (2.4 g a.i./L) were applied to commercial vines of *Vitis vinifera* cv. Zinfandel at 10%, 50%, 100% bloom, or 2-3 weeks after bloom in Madera (Southern San Joaquin Valley), Stanislaus (Central), and Sacramento (Northern) Counties in 1993 and 1994. Berries and floral debris were sampled ca. 2 weeks after treatment and examined for colonization by *B. cinerea, A. niger,* and *Penicillium* spp. Berries were shaken in buffer solutions and aliquots were plated on agar media to determine fungicide effects on epiphytic mycoflora. Remaining clusters were evaluated at harvest for incidence and severity of summer bunch rot fungi. Bloom sprays reduced floral debris colonization, epiphytic survival, and final disease by *B. cinerea* in all trials in both years. Reductions in *B. cinerea* rot were often offset by increases in *A. niger* rot in fungicide treated clusters, resulting in no significant reduction in total incidence of rot. Incidence of sour rot (caused by *Acetobacter* spp.) At harvest was not consistently affected by the fungicide treatments. Iprodione bloom sprays may not be effective in areas where *A. niger* or sour rot predominate.

Evidence of Systemic Invasion of Olive Trees by the Olive Knot Bacterium *Pseudomonas savastanoi*.
M. N. Schroth, W. Krueger, S. Wang, and B. L. Teviotdale, U. C. Berkeley, UCCE Glenn County, and U. C. Kearney Ag Center

Sudden outbreaks of olive knot in young, presumably disease-free trees and in older trees suggest that *Pseudomonas sevastanoi* survives as an internal resident, an epiphyte or both. Branch surfaces disinfested with bleach plus detergent were vacuum infiltrated with water and the extruded liquid plated on King's B culture plates. Small pieces of wood removed from the branches were either triturated and plated or drawn across the surface of King's B culture plates. *P. savastanoi*, in populations of 10^6 or greater CFU per 1.0 ml exudate, and several unidentified bacterial species were isolated during winter and early spring. In winter, spring and summer, intact limbs swabbed with bleach were wounded with a surface-disinfested saw and immediately wrapped with tape or left unwrapped. Knots formed in winter- or spring-wounded but not in summer-wounded branches in both wrapped and nonwrapped wounds.

ENTOMOLOGICAL SOCIETY OF AMERICA, San Diego, CA, June, 1995

Winter Survival of Silverleaf Whitefly, *Bemisia argentifolii* Bellows & Perring, in the San Joaquin Valley. *Charles G. Summers and Larry D. Godfrey, U.C. Kearney Ag Center and U.C. Davis*

The silverleaf whitefly, *Bemisia argentifolii* Bellows & Perring, is established in the southern San Joaquin Valley from Kern to Merced County. While *B. argentifolii* overwinters in the Imperial Valley, its ability to survive the colder, wetter winters in the San Joaquin Valley is unknown. We conducted field studies in Kern, Fresno and Tulare counties to determine the winter survival rate of eggs, nymphs and adults under San Joaquin Valley conditions.

Biweekly samples were taken from mid-November through mid-March. Leaves containing eggs and nymphs were selected from broccoli, annual sowthistle, cheeseweed, prickley lettuce, spotted spurge, cauliflower, chrysanthemum and orange. Egg, "red-eye pupa" viability, and the percentage of live intermediate instars were determined in the laboratory. We found a 90% reduction in egg viability throughout the winter, but some early eggs were still viable in early March. We observed egg hatch in the field throughout the winter. Second and third instar nymphs had a survival rate of 20 to 60 percent. "Red eye" nymphs survived the winter on both fresh and dead leaves. Adults were found in the field every month except January.

Integrated Management of Grape Mealybugs in Table Grapes. *Walt Bentley and Jason Kosareff, U.C. Kearney Ag Center*

Bi-monthly vine counts were made in 3 table grape vineyards in Kern County during 1993 and 1994. Location on the vine and stages of grape mealybug, *Pseudococcus meritimus*, growth were identified. Two generations were identified with severe infestation occurring with the second generation moving to bunches in August.

Timed insecticide applications indicate that the delayed dormant treatment timing, applied just at budswell provided the best reduction in mealybug numbers. This timing integrates well with the parasite *Ascerophagus notativentris*.

Problems in parasitism occur where the Southern fire ant, *Solenopsis xyloni*, is found associated with the grape mealybug.

Communication Disruption of Orchard Moths Using a Biodegradable Pheromone Dispensing System. *R. E. Rice, C. A. Atterholt, M. J. Delwiche, and J .M. Krochta, U.C. Kearney Ag Center and Davis.*

Standard commercial pheromones of oriental fruit moth *Grapholita molesta* (Busck), and peach twig borer *Anarsia lineatella* (Zoeller), were mixed in liquid or semi-liquid lipid-based carriers and applied to stone fruit and almond trees in Fresno County, California. Two to four replicates comprised of five or nine trees each were treated with the pheromone/lipid emulsions at concentrations ranging from 6.0 to 34.0 grams pheromone ai per acre. Each treated replicate was monitored with standard pheromone traps and response of male moths in treated versus untreated portions of the orchard was determined. Results of these field trials in 1994 showed reduced or complete trap shutdown for up to three weeks with oriental fruit moth but only for five days for peach twig borer during warmer weather in midsummer. Only pheromone trap shutdown and communication disruption was evaluated in these preliminary efficacy trials; we did not evaluate damaged fruit in treated versus untreated trees. The objectives of this work are to develop biodegradable, less costly, and mechanically applied mating disruption systems that retain or improve efficacy found in current polymer pheromone dispensers. Further field trials are planned with lipid-based pheromone dispensing systems in 1995.

IPM NOTES

UPDATE ON THE IPM INITIATIVE
Peter B. Goodell, U. C. Kearney Agricultural Center

In December 1994, the USDA announced IPM as one of its national initiative. (See PPQ, Jan. 1995, p 9). Such a move elevates the importance of IPM as a national issue and can result in increased activity. This action is a response to the Administration's policy on pesticides and food safety it established a national goal implementing IPM on 75% of all cropland by the year 2000 (see PPQ April 1994, p11) The IPM Initiative provides the opportunity for renewed interest in developing IPM systems at the Federal level and could result in increased funding for IPM research and extension activities. The Extension IPM budget was enhanced during FY95 during a period of overall funding declines. USDA considers IPM to be an important national issue whose progress and success is measurable.

Of particular importance is the commitment of public and private groups to work together in developing this initiative. This is critical to its success. Producers, PCAs, and NGOs (non-governmental organizations) are expected to provide input to identify and define specific IPM priorities and play an active role in reviewing program progress. Within the public arena, the Federal government is dedicated to interagency cooperation. The initiative is a joint effort of USDA-CSREES, Land Grant Colleges, EPA, and other USDA agencies.

There are a number components contained in the Initiative. The effort uses existing funds and programs as well as new requests for FY96. The following document provides an overview of these components. However, it is instructive to detail some aspects of the National IPM Initiative (NIPMI). NIPMI is divided into three phases. Phase I is the development of IPM teams, consisting of public and private players. Its purpose is to identify potential opportunities for improving IPM adoption through the interaction with end users and the identification of priority research and extension needs. Through a peer-reviewed process, 23 planning grants were awarded in 1995 to develop these teams. California did not submit a formal proposal, but examples of such teams can easily be identified within the state.

Of current interest will be Phase II of NIPMI which seeks to develop and deliver IPM technologies to “regional” cropping systems. The definition of regional is unclear, but is not defined to be only multiple state (6 of the 23 Phase I proposals were single state projects). The proposals will rely on the IPM team input described in Phase I to develop a proposal. The RFP for Phase II is under development and should be available if funding is approved in FY96 in time for the Third National IPM Symposium in Washington D.C., February 27 to March 1 1996. It is not necessary to have been awarded a Phase I planning grant to be eligible for consideration for Phase II.

Phase II (if funding is provided in FY96) will allow major IPM research and development. Requests can go as high as $500,000 per year for five years. It will consist of a combination of research and extension and requires full participation of IPM teams. It will require specific assessments of impacts as well. This assessments follows the current interest in evaluation of programs. IPM nationally was selected as one of the pilot programs for the Government Performance and Results Act (GPRA) in nine states. Assessment of results will play a key role in these projects. If Phase II is enacted, this infusion of funding into IPM may provide key opportunities for plant protection research and extension.

The following are more details from CSREES concerning the IPM Initiative.

IPM INITIATIVE: A PARTNERSHIP
USDA - Land Grant Universities - Producers
Issued: Thu, 6 Jul 1995 12:46:36 EST

What is the IPM Initiative? This Initiative redirects and combines USDA and Land Grant University programs into a single coordinated and cooperative effort to address important pest control problems through a partnership with producers.

Highlights:

- To Achieve the National Goal of IPM on 75% of Crop Acres by 2000
- Needs Assessment: Producers in each State identify their needs
- Development: Researchers at Land Grant Universities and USDA (ARS, FS) develop knowledge and technology to address producer needs
- Implementation: Technology transferred through a proven network of research and Cooperative Extension staff at Land Grand Universities cooperating with the private sector
- Feedback: Technology is assessed for its fit in agricultural systems and modified as needed
- Accountability: Land Grant Universities, Cooperative Extension and USDA collect data to document impacts of IPM on pesticide use, pest levels, use of alternative controls, and IPM adoption

Benefits

- Increases producer profitability and competitiveness
- Provides consumers safe, high quality, economical supply of food and other agricultural products

- Reduces environmental and human health risks associated with pesticide use on Farms, Ranches, Homes, Parks, Forests, Buildings, and Range lands

- Opens and enhances new export markets

- Enhances sustainability of natural resources

- Supports new business opportunities in consulting and production of new IPM products

A Proven Program - 1993 Program Highlights

- Environment: Over $667 million in reduced pesticide expenditures

- Economics and Efficacy: Increased profitability and quality for producers of cotton, corn, soybeans, forage crops, wheat, barley, fruits, vegetables, ornamentals, turf, poultry, cattle, and swine

- Technology Transfer: Over 2,000 county and regional demonstrations of IPM methods

- Encouraged Small Business: Privatization of IPM services through IPM education and technology transfer programs with over 20,000 consultants and scouts

- The IPM Initiative reflects redirection and combination of old and new resources of USDA and Land Grant University programs into a single coordinated and cooperative effort with farmers, private consultants, and industry to achieve the national goal of IPM on 75% of the crop acres by t he year 2000.

COOPERATIVE STATE RESEARCH, EDUCATION, AND EXTENSION SERVICE (CSREES)

<u>IPM and Biological Control Research (PL89-106 Special Research)</u>:

Regional competitive grants program directed toward new knowledge and solution of state or regional production and environmental problems.(1996 budget request $7.0 million)

<u>Pest Management Education (Smith-Lever 3(d))</u>:

An extension education program to hasten broad implementation of proven IPM strategies on farms, forests, homes, parks, industrial or public buildings, and range lands. This program will accelerate the technology transfer process from researchers to IPM producers and will assist the private sector in developing and improving delivery of IPM services. IPM teams with farmers, consultants, and commodity groups have been formed in each state. (1996 budget request $15.0 million)

<u>National IPM Implementation Program</u>:

A new competitive research and extension grants program supported with 1996 funding increase requested in "IPM and Biological Control" and "Pest Management Education" budget lines (above). Projects will proceed through three phases:

<u>Phase I</u>: Formation of IPM development and implementation teams. Farmers, consultants, research and extension staff and state, federal agencies and others identify research, technology and education needs to implement IPM in a production region. In 1995, 23 teams involving 39 states were funded at up to $20,000 for 1 year.

<u>Phase II</u>: Development and implementation projects address identified needs. Proposals developed by IPM research and implementation teams will be submitted for funding in fiscal 1996, should funds be available. Funding is anticipated to be $500,000 per year per project for up to 5 years. Proposals must address privatization.

<u>Phase III</u>: Privatization of IPM system in production region.

<u>Pest Management Alternatives for Farmers</u>:

A new competitive grants program to: 1) provide farmers with chemical pesticides, biological control products or cultural tactics to replace agricultural chemicals which are under regulatory consideration and for which producers do not have effective alternatives; 2) provide alternatives where pest resistance limits IPM options; and 3) implement new alternative pest management tactics. (1996 budget request $4.5 million)

<u>Agricultural Research Service (ARS)</u>

Areawide IPM Research: This program focuses on management of pests where existing technologies (including pheromones, biocontrols and alternatives to hard pesticides) are most effective when used over a multistate area. Control of codling moth with mating disruption on apple and pear in the western United States is an example.

Other pest/crop systems are currently under evaluation. (1996 budget request $9.5 million)

Economic Research Service (ERS)

Evaluation of IPM Programs: A program to analyze pest management data and develop procedures for: 1) development of economic thresholds, and 2) economic, environmental and public health impacts of IPM programs and efficacy of alternative pest controls. Collaboration with National Pesticide Impact Assessment program and the National Agricultural Statistics Service are critical to the IPM Initiative. (1996 budget request $0.3 million)

TOTAL IPM INITIATIVE BUDGET REQUEST = $36.3 MILLION