November 12-13, 1997 • University of California, Davis

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AGENDA

Wednesday, November 12, 1997

8:30 - 8:50	Coffee/Rolls
8:50 - 9:00	Introduction (Joe DiTomaso)
9:00 - 9:10	California Weed Identification Guide--Where are we? (Joe DiTomaso)
9:10 - 9:30	Fred Hrusa, Report from California Department of Food and Agriculture
9:30 - 9:50	Exploiting Seed Dormancy and Crop Residues to Manage Weed Germination (Steve Fennimore)
9:50 - 10:10	From the South (Albert Fischer)
10:10 - 10:30	Biological Control of Weeds with Gliocladium virens (Chad Hutchinson)
10:30 - 10:50	Break
10:50 - 12:20	Breakout Sections: Trees and Vines OR Aquatics
12:20 - 1:30	Lunch - on your own
1:30 - 1:40	Election of new committee members to replace Milt McGiffen and Steve Orloff
1:40 - 2:00	Section Report: Trees and Vines
2:00 - 2:20	Section Report: Aquatics
2:20 - 4:20	Breakout Sections: Vegetable Crops OR Non-crop Areas
4:20 - 4:40	Section Report: Non-crop Areas
4:40	Adjourn

Dinner will be hosted at the home of Clyde Elmore in Davis.

Thursday, November 13, 1997

7:45 - 8:10	Coffee/Rolls
8:10 - 10:10	Breakout Sections: Agronomics OR Turf and Ornamentals
10:10 - 10:30	Section Report: Turf and Ornamentals
10:30 - 10:45	Break
10:45 - 12:00	Discussion of Priority Research and Extension Needs • Weed Research and Information Center • Weed School and upcoming Weed Meetings • Arsenal (imazapyr) and Transline (cloypralid) in California • Tim Prather's weed seedling diagnostic computer program • Kearney Ag Center or Fresno County UCCE office as a future site for Weed Workgroup Meetings
12:00	Adjourn
12:00	Executive Committee Meeting

General Session

The morning session included an introduction to the status of the "Weeds of California" text, and talks from three new University of California (Steve Fennimore and Albert Fischer) California Department of Food and Agriculture (Fred Hrusa) scientists, and Chad Hutchinson from UC Riverside (postdoc with Milt McGiffen).

Joe DiTomaso introduced Evelyn Healy, who was hired in July to organize and write much of the weed text. A handout was distributed (Appendix A), outlining the format for each main species covered in the text. In addition, the data acquisition program (written in Access) was demonstrated. Thus far, the project has received $90,000 in support from the California Weed Science Society, $15,000 from Smith-Lever, and a portion of $9,000 from the California Exotic Pest Plant Council (CalEPPC) for the development of a brochure on weedy Cortaderia in California. Fred Hrusa indicated that the CDFA herbarium contained over 20,000 specimens, most of which are weeds or native plants of California. The herbarium and seed labs are open to the public. Fred's major responsibilities include identification of plant material. The majority of identification requests come through the County Ag Commissioners office. Many are also border confiscation of noxious weeds. These identifications are accumulated in a database. Also included in a database are known localities of A and B rated noxious weeds. Maps, however, are hand produced by township and section. Anyone can have access to this information. CDFA will download the entire database (7000 entries) or provide maps on request. Fred's email address is fhrusa@smtpl.cdfa.ca.gov. However a better address to reach him is gfhrusa@ns.net. This address will not scramble attachments.

Steve Fennimore is the new Vegetable Weed Specialist in Salinas. He indicated that his major areas of research interests include germination and growth characteristics, reproduction, seed longevity, and weed patchiness. He is currently involved in establishing weed control projects in artichokes, celery, cole crops, lettuce, and strawberries. Down the road, he will also work with carrots, onions, peppers, spinach, and vines. From a more physiological perspective, Steve hopes to continue his research on seed dormancy as a way to predict weed emergence patterns. In addition, he will evaluate allelopathic germplasm of Brassica species, and aspects related to weed dispersal.

Albert Fischer is the new Rice Ecophysiologist at UC Davis. He has a research/teaching appointment. He reviewed some of his research work while with CIAT in Columbia. This included projects designed to predict rice yield losses by mixed weed infestations, strategies for controlling junglerice in various rice cultivars, identifying the mechanism of propanil resistance in Echinochloa colona. More recently, he has been working on Kochia resistance with scientists from North Dakota State University. In his new position, he will focus his research efforts on rice, including continued work on weed resistance, testing for new herbicides as alternative control methods, development of weed suppressive cultivars, develop models for weed loss prediction, examine physiological responses to habitat modification, and investigate rice-weed interference.

Chad Hutchinson is a post-doc working with Milt McGiffen at UC Riverside. He is currently working with alternative strategies to methyl bromide, such as methyl iodide, but described his Ph.D. project at Purdue University. His work there focused on developing a soil borne pathogen biocontrol agent (Gliocladium virens) for control of annual ryegrass. Under conditions were nutrients are not lacking (chicken manure), this fungus produces high levels of several antibiotics, including viridiol. In the field, 15% inoculated compost at ¾ in depth provided 80% weed control and 67% reduction in growth.

Breakout Sessions

Trees and Vines

No report available.

Aquatic Weeds (Reporter: Lars Anderson)

Research accomplishments:
Results in 1997:

a) Tested injection systems for using copper-based herbicides to control Egeria densa in the Sacromento delta. Delta;
b) Dr. Spencer obtained good suppression of hydrilla sprouting with acetic acid applied a soil-drench;
c) investigated interaction of Egeria and coontail in controlled tank;
d) assessed viability of Egeria fragments produced during mechanical harvesting in the Sacramento delta.

What is currently being done:

a) Analyzing levels of fluridone in non-target emergent plants at Clear Lake;
b) comparing efficacy of "biological" products with "claims" for improving pond/lake conditions;
c) determining partitioning of fluridone between water column and pore-water.

Extension accomplishments:
Current solutions: Projected funded to support Egeria management with Ca. Dept. of Boat. Waterways: ID's of several accessions of M. spicatum and RAPDs run on same. Use of Hydrothal 191 for algae control shown effective when copper products failed due to extreme water hardness.

Publications status: Assisted in IPM drafts for aquatic weed manual; drafts of updated chapter for Ca. Weed Sci. Soc. book; plus papers on American pond weed, hydrilla tubers (acetic acid)

Planning accomplishments:
What are the problems: Efficacy of sonar in flowing water (Egeria in the Delta); control of Spartina alterniflora; frogbit? ; spread of M. spicatum at Lake Tahoe; algicides needed. Future research needs: Effects on M. spicatum on nutrient cycling at Lake Tahoe; improving efficacy of Garlon on parrot feather

Future extension needs: Handbook for aquatic weed control in California Need good slide set for Ca. aquatic weeds (including rice)

How will goals be accomplished: a) project funded to survey and due pilot mech. (dredge) removal of M. spicatum at Tahoe; proposal for studies on cutting and use of Roundup on Spartina alternaflora (with Dr. Don Strong)

Who is going to do the work: L. Anderson or Dave Spencer

Training accomplishments:
Meetings held: Several lectures on aquatic weeds presented by L. Anderson, D. Spencer (e.g. PAPA; Son. City Parks; Target); 3-unit courses on Aquatic Plant Biology and Management taught by L. Anderson

Vegetable Crops (Reporter: Tom Lanini)

Artichokes
A shift toward annual varieties is occurring in the Salinas Valley growing area. Pronamide (Kerb) may be lost and therefore a search for alternatives is occurring. Harry Agamalian is evaluating Pendimethalin (Prowl) and Artichokes have shown good tolerance.

Carrots
Kurt Hembree is examining Pendimethalin (Prowl) for use in carrots (? Or was it Harold Kempen). Results to date show carrot has good tolerance.

Cilantro
Although no work is currently being done on this crop, it was thought that cilantro should be included with Chinese parsley and therefore allow the use of prometryn (Caparal).

Cole crops
Several herbicides have been evaluated for selectivity in cole crops by Harry Agamalian, including metolachlor (Dual), napropamide (Devrinol), and propachlor (Ramrod). Metolachlor was found to be a bit too phytotoxic to the broccoli, propachlor had good safety, and napropamide was too persistent and also was slightly phytotoxic (@ 2lb/a). Prefar (bensulide) and Dacthal (DCPA) were used as standards in these trials. The objective of these studies was to find a replacement for Dacthal.

Harry Agamalian has been looking at the carryover of halosulfuron (Permit). Of the crops planted 100 days after halosulfuron application, tomatoes and peas were tolerant, alfalfa cotton, radish, and carrots were intermediate, and lettuce, broccoli and onions were killed. Milt McGiffen did a similar study and found cool season vegetables to be susceptible (lettuce, broccoli, spinach, and cabbage) and warm season crops to be tolerant (melons, squash, peppers, carrots, snap beans, and okra). It was also noted that cabbage was the most sensitive species, but was safe to plant at 6 months after application. Harold also noted that in an Imperial Valley test, alfalfa was tolerant to halosulfuron treatments made 2 months before planting.

Onions
Harry Agamalian has looked at metolachlor (Dual), pendimethalin (Prowl), bensulide (Prefar), and propachlor (Ramrod) for use in onions. Propachlor has shown the best selectivity and has also controlled yellow nutsedge. Pendimethalin and metolachlor were too phytotoxic.

Kurt Hembree has examined flaming with good tolerance when onions were at the two to three leaf stage.

It was suggested that enfuric would be a good product to have labeled in onions and garlic.

Spinach
Both metolachlor (Dual) and propachlor (Ramrod) have been examined by Harry Agamalian for safety and weed control in fresh market spinach. A concern with fresh market spinach is the need to avoid leaf burn that occurs with Spinaid (phenmediphen). Propachlor at 2, 4, or 6 lb./a was very safe on spinach. Triflusulfuron (Upbeet) was also evaluated at 0.03, 0.05, and 0.07 lbs./a with spinach yields being 93%, 76%, and 73% of the untreated, weed free control, when applications were made at the 2 leaf stage.

Currently, Betamix (phenmediphan + desmediphan) is not labeled for spinach but is weak on burning nettle, and Roneet (cycloate) is labeled for preemergence treatments.

Steve Fennimore has volunteered to write the Spinach pest management guidelines.

Tomatoes
Kurt Hembree is currently evaluating rimsulfuron (Shadeout) in processing tomatoes. He is looking at both preemergence and early postemergence treatments at rates between 0.375 to 0.5 oz/a. Control of nightshades is fairly good, but does not control most grasses or lambsquarters. In addition to weed control ratings, he is also comparing hand weeding times on these treatments for an economic evaluation of treatment effectiveness. Kurt is also looking at Frontier as a layby treatment in place of trifluralin (Treflan). Frontier is providing better control of nightshade than is Treflan.

Kurt Hembree has been looking at the timing of irrigation to incorporate rimsulfuron (Shadeout). He has looked at various times between application and irrigation and found that applications made within 5 to 7 days provided good weed control but waiting longer than this resulted in some loss of activity.

Harold Kempen noted that rimsulfuron is not yet federally labeled or into the 45-day comment period required by DPR and thus the chances of having this material for 1998 is in doubt. Harold also noted that carryover could be a problem on onions, cotton was OK, and that carrots had not been evaluated.

Mariano Battista and Tom Lanini have been looking at ways to predict future weed species and locations within a field. Studies have compared seedbank, previous year's seedlings, or previous year's seedrain as predictors of current weeds. Seedbanks have been the most accurate, but increased sampling is required for increases in precision. This work is continuing.

Tom Lanini has been looking at a biocontrol agent for dodder control in tomatoes. The pre-emergence treatments have been very effective; however, even the controls had good control, as white flies appear to be moving the spores of the fungi from plot to plot. More isolation is needed to determine the formulation which will work best. Postemergence treatments have not been effective, perhaps due to the dry conditions at the time of application, not being conducive for spore germination or survival. Work is continuing on the Heinz tomato variety H9492, which has show to be resistant to dodder.

Enrique Herrero and Jeff Mitchell have been looking at no till planting of tomatoes into dying mulches. To date, the mulches have not adequately suppressed weeds and some optional weed control measures may need to be implemented.

David Slaughter has been looking at using a video guided sprayer, which is able to spot treatment in the row. Vision recognition of the tomatoes slows the process limiting speed of the current machine to less than 1 mph, but a new transgenic purple tomato may improve recognition and increase speed.

A publication on resistance management was thought to be needed to prevent resistance buildup with all the new ALS herbicides coming into the market.

Non-Crops (Reporter: Joe DiTomaso)

For a summary of progress in yellow starthistle control, see Appendix B. In addition to this extension paper, Joe DiTomaso, Guy Kyser, and Carri Benefield are preparing 4 additional manuscripts on yellow starthistle biology, chemical control, mowing, and burning. Much of this work is in collaboration with Farm Advisors, particularly Steve Orloff, Dan Marcum, Glenn Nader, and Ken Churches. In addition, new projects studying rangeland management and yellow starthistle control are in progress with Steve Orloff, Dan Drake, Dave Pratt, and Larry Forero. Many of these projects will be part of the doctoral work of Steve Enloe. Other projects include work on perennial pepperweed (Ph.D. dissertation of Mark Renz), pampasgrass and jubatagrass (MS research of Jennifer Drewitz and Alison Tschohl), and projects on barbed goatgrass (Adina Merenlender) and Scotch thistle (Dan Marcum). These projects have only been initiated within the past year, and results are not currently available.

The group indicated that additional work needed to be conducted on medusahead, Russian thistle, and alkali heliotroph.

Agronomic (Reporter: Kurt Hembree)

Sugar Beets

Research accomplishments:
Robert Norris and Kurt Hembree discussed results of Liberty resistance sugar beet trials: glufosinate (Liberty) not as efficacious as Roundup resistant beets. Concern was expressed as to the low rates of Liberty tested. Liberty beets bolted and did not have rhizomania resistance. Early postemergence treatments of UpBeet provided excellent cocklebur and velvetleaf control if weeds were at the cotyledon stage of growth when treated and if they were properly identified. No new herbicides tested. Registration status of Stinger is still unclear. Steve Orloff said Vapam was not providing adequate control of kocia, lambsquarters, or pigweed. Further evaluations of Liberty beets will be conducted as well as economic comparisons of weed management options.

Extension accomplishments:
California sugar beet growers are presently satisfied with the current extension activities. The IPM Guidelines need to be updated to include the newly registered herbicides.

Planning accomplishments:
There are not any major problems associated with weed control. Most problems appear to be related to specific weeds in specific areas. Future extension tactics should include weed identification and timing of application.

Training accomplishments:
None noted
Other areas of concern included developing resistance strategies and the importance of herbicide resistance management in adapting to sulfonylurea herbicides (like UpBeet) and in the future of Roundup.

Alfalfa

Research accomplishments:
Trimmer provided a broader spectrum of control with less residual than Pursuit. It is also more effective on grass species. Wild oats, annual bluegrass, and canarygrass control needed.

Extension accomplishments:
Ron Vargas, Mick Caneveri, Dan Putnam, Tim Prather, and Tom Lanini are working on a publication for interseeding (oats, burseam clover, etc.) in established alfalfa stands. It should be completed by mid-May, 1998.

Planning accomplishments:
Dodder and Setaria species are the primary weeds of concern. The registration status of thiazopyr (Visor) for their control in alfalfa is not known. The registrant is not currently pursuing it. Training on weed identification and herbicide selection is needed. Kurt Hembree held a training session in 1996, but others are still needed.

Training accomplishments:
None noted

Cotton

Research accomplishments:
Roundup resistant cotton tested showed yellow nutsedge and annual weed control was best achieved at rates of I - 2 LB a.i./acre. Harold Kempen said it was weak on purple nutsedge in Kern County. BXN cotton being tested. Kurt Hembree is looking at visor for fallow bed weed control and subsequent plant-back restrictions. Tim Prather said the light activated sprayer gave excellent control of nutsedge in cotton in Corcoran, reducing spraying days from 3 to 1. Tim also said he seen good control of field bindweed using a propane flamer at 40 - 60 psi in 7" tall cotton. Cotton tolerance to flaming was good. Bermudagrass control was better if flamed twice and covered with soil through cultivation than with cultivation alone.

Extension accomplishments:
None noted. Publications are current.

Planning accomplishments:
Bladex will be phased out by the year 2000; other alternative herbicides need to be evaluated. The impact of flaming on beneficial insects needs to be looked at. Additional training on sprayer calibration and application for low use-rate herbicides (Staple) needed.

Training accomplishments:
None noted.

Beans

Research accomplishments:
Ernie Roncoroni said black nightshade control was excellent when Frontier was used at up to 1.0 lb. a.i./acre. Weed control on bed shoulders was excellent where Frontier was used. Plant-back questions need to be answered. Trimmer (a Pursuit analogue) provided good control with shorter residual problems. Axium provided weaker control of black nightshade than a tank-mix of Sencor plus Dual. Hairy and black nightshade failures with Sonolan

noted. FMC's 8426 provided good control of annual morning glory but injured beans. Permit shows promise for nutsedge control.

Extension accomplishments: None noted.

Planning accomplishments:
Black and hairy nightshade are resulting in quality problems, while morning glory and nutsedge are causing competition problems, additional research needs to be done. Additional work with Frontier and Trimmer need to be continued. Injecting Eptam into irrigation water needs to be investigated for nightshade control.

Training accomplishments: None noted.

Cereals/Corn

Research accomplishments:
Steve Orloff and Ernie Roncoroni said Roundup was hard on Roundup-resistant corn. Split applications were effective on johnsongrass. Liberty provided good weed control in young corn. Puma and Achieve both provided good weed control.

Extension accomplishments: None noted.

Planning accomplishments:
Puma needs to be evaluated for canarygrass control in cereals. FMC's 8426 should be investigated. Avenge is only providing 25% control of wild oats, resistance is a concern. Hoelon registered on wheat, but not barley. Registration needs to be pursued.

Training accomplishments: None needed.

Rice
No information was provided.

Turfgrass (Reporter: Clyde Elmore)

Research accomplishments:
Finished research

1. Selective control of bermudagrass in cool season turfgrass. Herbicides containing triclopyr, fenoxaprop and ethafumosate were applied one or more times at intervals during the summer for suppression and control of bermudagrass. Tall fescue and perennial ryegrass were tolerant to these herbicides. Paper published: Weed Technology. 1997. A follow up paper will be published in California Agriculture.
2. Invasion resistance of perennial ryegrass and tall fescue to Kikuyugrass. Ryegrass or tall fescue was overseeded into Kikuyugrass to determine suppression. Tall fescue was more suppressive than ryegrass. Kikuyugrass plugs were planted into established tall fescue and perennial ryegrass and invasion and establishment was evaluated. Turf-type tall fescue reduced the invasion of Kikuyugrass over a 2-year period. Paper published in Weed Technology, 1997.
3. Smutgrass (*Sporobolus indicus*) has been controlled with wick applications of 33% glyphosate without injury to bermudagrass turf. Glufosinate, fenoxaprop, fluazifop or sethoxydim was effective sprayed over the grass but injury was severe on bermudagrass. Seedlings were controlled with all preemergence herbicides tested.
4. Kyllinga (perennial running sedge) has been controlled with 2 applications of halosulfuron (Manage) as a post emergence application.
5. Dallisgrass was controlled from seed with all preemergence herbicides tested.
6. Crabgrass has been effectively controlled with the preemergence herbicides pendimethalin, prodiamine, dithiopyr and the older materials. Post emergence applications of fenoxaprop have been effective on 2 to 3 leaf crabgrass when it is not stressed for moisture.

Research work in progress:

1. Kyllinga control in turfgrass. Seedling control with preemergence herbicides.

2. Reduced rate preemergence herbicide applications in conjunction with overseeding of tall fescue turf in the fall.
3. Research being established to evaluate the potential of vigorous tall fescue and perennial ryegrass varieties of reducing the invasion of bermudagrass.
4. Cultural factors relating to Oxalis corniculata invasion and establishment.

Extension accomplishments:
Publications:
Need to revise the Turfgrass Pest Manual. Add section on indicator weeds for various turf conditions. (Exp.) Annual bluegrass/crabgrass = frequent watering.

Pest Notes - Homeowner orientation
1. Spurge (prostrate and creeping)
2. Oxalis (creeping and yellow buttercup)
3. Nutsedge

Future research needs
1. English Daisy (Bellis perenne) has not been controlled well in coastal turfgrass areas (golf coarse). If cities such as San Francisco banns herbicides, then there will be a major influx of daisy in high maintenance turf.
2. Annual bluegrass has not been controlled well in bentgrass greens.
3. What is the potential for allelopathy with ryegrass or fescue? What weeds could be controlled?

Training accomplishments:
Meetings:
1. Turfgrass field day - UC. Riverside (industry).
2. Bay Area Turfgrass and Landscape Field Day (industry)
3. Professional Turfgrass Research Update. UC Davis (industry)
4. OHECC Turfgrass Workgroup (University In-service Training)

Ornamentals (Reporter: Clyde Elmore)

Research results:
Container grown ornamentals
Herbicides and mulches were evaluated in 5 gal containers with Rhapiolepis indica at South Coast Field Station and Davis. Pecan shell mulch reduced annual bluegrass number and dry weight in the container compared to the untreated control. The by-product corn gluten meal at the recommended rate had little affect on Poa annua at Davis or broadleaves at SCFS. The herbicide oxyfluorfen + oryzalin (Rout) was very effective for grass and broadleaf control at 2 + 1 lb./A. Geotextile collars around the plants reduced weeds but did not give complete control (weeds grew around the hole and cuts of the collar. Whenever Rout was combined with other treatments, control was excellent.

In container tests using Buxus, prostrate spurge was controlled with isoxaben, oryzalin, pendimethalin, combinations with oxyfluorfen and oryzalin or oxyfluorfen and trifluralin. Creeping spurge had a similar susceptibility to herbicides as prostrate spurge.
Landscape plantings
Geotextile mulches and Biobarrier II was applied in woody landscape plantings. Weed control was excellent except for Washingtonia Palm seedlings.

Field Grown cut flowers
Weed control studies were established in Limonium, Delphinium, Snapdragon and China Aster transplant plantings. Preemergence herbicides were evaluated on all crops. Mulches (finished "greenwaste", and rough "greenwaste" (6 weeks age) were applied after transplanting. Solarization was used at 4 or 6 weeks in the summer before transplanting. Post emergence herbicides were applied on Limonium only. Plant susceptibility varied by the

herbicide and rate. Increased growth was observed with most plants in solarized plots. Both mulches gave good annual weed control but did not control field bindweed.

Current Work:

Field grown flower studies are continuing with snapdragon, China aster and Delphinium at Davis, Bay Area Research and Extension Center (BAREC), and South Coast Research and Extension Center) SCREC. Bulb trials with Ranunculus and Dutch Iris will be established at BAREC and Davis.

Extension accomplishments:

Meetings:

1. Bay Area Turfgrass and Ornamentals Field Day—(BAREC)
2. Training meeting for farm advisors at the same location.
3. Meeting to be held at SCREC in December. Publications:
4. Pest Notes
5. Spurge (Prostrate and Creeping)
6. Oxalis and Bermuda buttercup
7. Nutsedge
8. Weed control in the Landscape

Planning accomplishments:

Future needs and problems:

1. Creeping spurge is becoming more of a problem in landscape plantings. There is need for information on control in the landscape.
2. There is the potential for loss of the herbicides oxyfluorfen and pronamide as well as DCPA (Dacthal). These would be major losses for the ornamental industry. New herbicides that may control nutsedge (halosulfuron and thiazopyr) also need to be evaluated.
3. Mulch: "greenwaste" has given good control, but must be evaluated for economics and feasibility for transplanting into the mulch, or it will not be a viable treatment.
4. Evaluation of Biobarrier II on perennial pepperweed in the landscape along Caltrans land.

Publication Needs:

1. Nursery Production Manual -In progress
2. Floriculture weed control Leaflet

Training accomplishments:

1. Meetings indicated above.
2. Participation in the Nursery Workgroup
3. Participation in the Floriculture Workgroup.

Discussion of Priority Research and Extension Needs

1. Next year the Weed Science Workgroup will be held at the Kearney Field Center. Tim Prather will be in charge of arrangements and Kurt Hembree will organize the agenda.
2. Weed Workgroup appointed a standing committee to promote the IR4 program for minor crops. Steve Fennimore and Kurt Hembree will represent this committee. Carl Bell and Bob Mullins will also be contacted to serve on the committee. It was noted that letters from influential growers would provide important support for IR4 registrations.
3. Priority for hiring new Weed Specialist and Farm Advisor positions was discussed. It was agreed that Harry Agamalian's position (Horticulture/Weed Science) in Monterey County was the highest priority and that Harold Kempen's position in Kern County was second highest. At UC Davis, the highest CE priority was a replacement for Larry Mitich.
4. Tim Prather updated the group on the progress of the Weed Seedling Diagnostics Program. This program will be used in conjunction with the text prepared for seedlings of 100 to 120 weed species.
5. David Visher and Kitty Schlosser reported on the progress of the Weed Research and Information Center (WeedRIC). They outlined the mission statement, objectives, and infrastructure of the Center (see Appendix C). Joe DiTomaso discussed funding opportunities, services the Center can provide to stakeholders (see Appendix D), and the involvement of the Weed Science Workgroup.
6. The format for electing new workgroup program committee members was changed to accommodate WeedRIC executive committee appointments (see Appendix D). Each newly elected member of the Weed Workgroup will serve for 4 years and the chair will serve for 2 years as chair. The chair is an official member of the WeedRIC executive committee.
7. Lars Anderson, Dave Cudney, and Mick Canevari were elected to the Weed Science Workgroup Program Committee and Kurt Hembree was selected as the 1998-99 chair. Mick Canevari was not present and his appointment is contingent upon his acceptance of the position.

Appendix A

Waterplantain (Alisma plantago-aquatica L.)[ALSPA]

SYNONYMS: A. triviale Pursh; A. subcordatum Raf, A. brevipes Greene

GENERAL DESCRIPTION: Tufted native perennial marsh plant, but behaves as an annual in California rice fields. Leaves variable, mostly emergent, to 0.5 m, occasionally floating. Flowering stalks taller than leaves, to 1.2 m. Considered weedy only in agricultural systems. All plants in the waterplantain family have milky juice.

SEEDLINGS: Cotyledon elliptic to lanceolate, long-stalked, typically floating. Stalk often red tinged. Immature leaves lack blades or blades much reduced.

MATURE PLANT: Leaves basal, lanceolate to ovate, with long petioles that sheath a short, bulbous stem base. Leaf bases truncate to nearly cordate. Blades 5-20 cm long, 1-10 cm wide. Main veins parallel, with tiny transverse veinlets.

ROOTS and UNDERGROUND STRUCTURES: Fibrous, all adventitious. Stem base corm- like.

FLOWERS: June-July. Bisexual, arranged in whorled panicles, with each branching node subtended by 2-3 leaf-like papery bracts. Petals 3, separate, deciduous, white, rarely pink, ovate to rhombic, with rounded tips. Margins smooth or minutely toothed (erose). Sepals 3, green, persistent, ovate. Stamens 6, arranged in pairs opposite petals. Carpels numerous, separate, arranged in a ring on a flattened receptacle.

FRUITS and SEEDS: Ring of achenes form fruiting head 3-5 mm diameter. Achenes sector- like, strongly compressed, 2-3 mm long, longer than wide, each with a short ventral beak and rounded back. Lateral walls generally thick and opaque. Air-filled tissues cause achenes to float.

POSTSENESCENCE CHARACTERISTICS: Dead leaves decay rapidly in water.

HABITAT: Grows in shallow water or mud; ponds, rice fields, wetland margins.

DISTRIBUTION: Widespread native throughout CA, except Great Basin, Mojave and Sonoran Deserts; to Canada, southeastern U.S.; Eurasia, south, east, and northern Africa, and Australia. To 5300 ft (1600 m).

PROPAGATION/PHENOLOGY: Reproduces by seed. Seeds buoyant for up to 2 months. Germination erratic because of mechanical dormancy imposed by hard seed coat. Some seeds germinate after first winter or dry season, others remain dormant for 4-5 years. Drying can induce rupture of seed coat. Scarified seeds germinate readily. Seeds survive frozen water or mud for several weeks.

MANAGEMENT FAVORING/DISCOURAGING SURVIVAL: Plants developing from seed reach optimal size in shallow water (~7 cm) and decrease linearly in size as water depth increases to 40 cm. Plants from corms reach optimal size in deeper water (~20-40 cm).

SIMILAR SPECIES: Lanceleaved waterplantain (Alisma lanceolatum With.)[ALSLA], an introduced perennial, generally has narrower leaves (1-3 cm wide) with tapered bases and pink to purplish flowers. Typically petals taper to a point (acuminate). Lateral walls of achenes thin and translucent. Found in northwestern CA, northern Sierra Nevada foothills, and the Sacramento Valley. To 1700 ft (500 m). Arrowhead (Sagittaria spp) superficially resembles the waterplantains. For a comparison, open this **Leaf Table** (1 page, 25 kb).

Appendix B

Control of Yellow Starthistle with Herbicides

Joseph M. DiTomaso, CE Non-Crop Weed Specialist, UC Davis and Steve B. Orloff, Farm Advisor, Siskiyou County

Yellow starthistle (*Centaurea solstitialis*) is one of the most aggressive and invasive weeds encountered in non-irrigated range and non-crop areas. For any yellow starthistle control program to be effective, it should be designed to ultimately deplete the starthistle soil seedbank. This will require at least three years of persistent management with no or minimal new seed production. An integrated approach using mechanical, cultural and chemical control measures is typically the best way of managing this noxious weed. However, in many situations, control options are limited by physical, political, or economics constraints. Important considerations for the proper use of herbicides in a yellow starthistle management program are discussed in this pamphlet.

A limited number of herbicides are registered for use in California rangeland and pastures. Of these, the majority is applied to the foliage of target plants, including yellow starthistle. Most of these compounds, including 2,4-D, triclopyr, dicamba, and glyphosate have little or no soil activity, and thus will not control seedlings emerging after herbicide application. In contrast, the newly registered herbicide clopyralid (Transline), has excellent soil (preemergence) and foliar (postemergence) activity. This pamphlet provides information on the use of these herbicides for control of yellow starthistle seedlings and mature plants in California rangelands and pastures, as well as important precautions and considerations for the development of long-term control strategies.

POSTEMERGENCE HERBICIDES

Yellow starthistle is difficult to control with postemergence herbicides. This is primarily due to the ability of starthistle seeds to germinate throughout much of the year when sufficient soil moisture is present. The majority of seeds, however, germinate in fall and early winter. While a single application of a growth regulator herbicide (2,4-D, dicamba, or triclopyr) will provide excellent control of seedlings, it typically will not control yellow starthistle for the duration of the season. These herbicides lack residual soil activity and will not provide control of plants germinating after the herbicide treatment.

Growth regulator herbicides only control broadleaf species and can be used in late winter or early spring to control yellow starthistle seedlings without harming grasses. Excellent postemergence control of seedlings can also be achieved at 2 pt of glyphosate per acre or spot application with 1% solution. However, glyphosate is a broad spectrum herbicide and will injury germinated grasses and other broadleaf species. The addition of a surfactant to amine formulations of 2,4-D and triclopyr can enhance yellow starthistle control. Yellow starthistle that has emerged by the time of herbicide application is controlled, but more starthistle emerges with subsequent rains.

Herbicide	Trade name	Product per acre	Rate per acre (lb. ae/A)
2,4-D	Weedar 64 and many others	2 to 4 pt	1 to 2
dicamba	Banvel, Vanquish	1 to 2 pt	0.5 to 1
triclopyr	Garlon 3A or 4	1.5 to 3 pt	0.75 to 1.5
glyphosate	Roundup Pro	2 pt	0.75

A single late application, at the end of the rainy season, is not sufficient as many plants are too large and escape injury. The most effective strategy for yellow starthistle control with these compounds is to use repeated applications throughout the season. However, this is expensive, increases herbicide load in these sites, and may prove ineffective should late-season rains occur. Clopyralid (Transline) is also a very effective postemergence herbicide. However, it also has excellent preemergence activity. Thus, it is discussed separately below under the section **PREEMERGENCE AND POSTEMERGENCE ACTIVITY**.

PREEMERGENCE HERBICIDES

A number of selective or broad spectrum preemergence herbicides control yellow starthistle, including simazine (Princep), diuron (Karmex), atrazine (Aatrex), sulfometuron (Oust), chlorsulfuron (Telar), bromacil (Hyvar),

tebuthiuron (Spike), and oxyfluorfen (Goal). All these compounds are registered for use on either right-of-ways or industrial sites, and cannot be used on rangeland and pastures, or by homeowners. These compounds are not as effective for the control of yellow starthistle as clopyralid (Transline) and will injure a number of desirable species, including natives and important forage species.

PREEMERGENCE AND POSTEMERGENCE ACTIVITY

Transline is a growth regulator herbicide. It is very effective for the control of yellow starthistle, as well as other invasive composites (Sunflower family), but does not injure grasses. The effectiveness of Transline on yellow starthistle can be partially attributed to its postemergence and preemergence activity. Hence, a single application at the appropriate rate will control emerged yellow starthistle and prevent more seedlings from emerging for a season. It is important to note, however, that Transline is a slow- acting herbicide and may require two months to kill susceptible species. Transline does not injure a few composites, such as spikeweed (Hemizonia pungens). In addition to composites, Transline injures most legumes, particularly annuals such as clovers and vetches. Injury to perennial legumes can be avoided when Transline is applied when legumes are dormant. Other plant groups that may be susceptible to Transline include some members of the nightshade family (Solanaceae) and the knotweed or smartweed family (Polygonaceae). In contrast, many other broadleaf species, including mustards and filarees, appear to be relatively tolerant to the herbicide (see susceptibility chart).

Since Transline is a relatively narrow spectrum herbicide, it is important to be aware of the species, which may replace yellow starthistle following application. In some cases, these species may be equally undesirable and additional management strategies should be employed to prevent their establishment.

Transline can be applied from the air (helicopter or plane) or by ground equipment. Under optimal conditions, 1/6 pt/acre (1 oz ae/A) of Transline can provide excellent control of yellow starthistle when applied from December through April. However, under drought conditions, higher rates are necessary. Thus, for consistent control of yellow starthistle, rates between 1/4 and 2/3 pt/acre are preferable. The higher rates are needed for aerial applications. When dead erect stems are present from previous year's infestation, control can still be achieved with labeled use rates. Higher rates may provide measurable control for a second season. When the objective is to enhance rangeland forage while reducing yellow starthistle, early application dates (January to February) are preferred. Although Transline kills starthistle up to the bolting stage (April or later), the competitive effects of starthistle this late in the season will result in low quantities of grass forage.

CONTROL OF MATURE PLANTS

In the rosette and bolting stage, higher rates of dicamba, 2,4-D, triclopyr, clopyralid, and glyphosate will control yellow starthistle. However, once bolted plants have produced spines and begin to flower, 3 to 4 pt/acre Roundup is the most effective herbicide. Unlike seedlings, 2 pt Roundup Pro per acre may not effectively control large rosettes or more mature plants. The best time to treat with glyphosate is after annual grasses or forbs have died but prior to yellow starthistle seed production. Applications after more than 5% of the spiny heads are in flower will not completely prevent seed production. Control is less effective when mature plants show physical signs of drought stress. When Transline has been previously applied, Roundup can be used in a broadcast or spot treatment follow-up program to kill uncontrolled plants before they produce seed, or to prevent the proliferation of potential Transline-resistant plants (see below). Roundup is not recommended when desirable perennial grasses or broadleaf species are present, except when used as a spot application.

LONG-TERM CONTROL

Any control program should be continued for at least three years to reduce the yellow starthistle seedbank. Whenever possible, make every effort to expose an infested site to high light during the germination period of yellow starthistle germination. This will deplete the seedbank more rapidly by increasing the rate of germination. Fall or winter grazing, burning, or mowing will provide increased soil surface light during the germination period. By comparison, tillage will bury seeds and prolong the dormancy period.

The presence of high populations of biological control agents (weevils and flies) does not appear to significantly impact yellow starthistle populations when used as the sole means of control. Although no evidence is available,

the presence of these organisms in combination with Transline applications may provide more long-term or sustainable control. Thus, landowners are encouraged to sustain high levels of the biocontrol organisms.

Reseeding infested areas with competitive perennial grasses and legumes may provide long-term sustainable control of yellow starthistle and higher forage quality. Another possible long-term approach is to alter grazing management strategies to maintain increased grass vegetative cover during the critical period when yellow starthistle rosettes are prepared to bolt.

PRECAUTIONS

Continuous Transline use will likely have a long-term detrimental effect on the legume population in the treated area. Consequently, other control options should be rotated in the overall yellow starthistle management program. In addition, the development of Transline-resistant yellow starthistle is possible. A Washington population of yellow starthistle developed resistance to repeated use of picloram (Tordon). This population was also resistant to Transline, which has a similar mode of action. The potential exists for the development of resistance to Transline if the herbicide is used year after year, with no other method employed. Resistance can be minimized by incorporating other control strategies or by utilizing late season applications of Roundup Pro to control escapes due to application skips or resistant plants.

TRANSLINE SUSCEPTIBILITY CHART (N = no control, P = partial control, C = control)

SPECIES OR PLANT GROUP	SUSCEPTIBILITY
Grasses (annual and perennial)	N
Chickweed (Stellaria media)	P to C
Fiddleneck (Amsinckia menziesii)	N
Mustards and other crucifers	N
Common lambsquarters (Chenopodium album)	N
Russian thistle or tumbleweed (Salsola tragus)	N
Filarees (Erodium spp.)	N
Teasel (Dipsacus spp.)	C
Puncturevine (Tribulus terrestris)	N
Prostrate knotweed (Polygonum arenastrum)	N
Smartweed or ladysthumb (Polygonum spp.)	P
Red sorrel (Rumex acetosella)	C
Curly dock (Rumex crispus)	P to C
Jimsonweed (Datura spp.)	C
Nightshades (Solanum spp.)	C
Annual clovers and other annual legumes	C
Perennial legumes	P or N during dormancy
Lupines (Lupinus spp.)	C
Burclovers and medics (Medicago spp.)	C
Alfalfa (Medicago sativa)	P or N during dormancy
Vetch (Vicia spp.)	C
Thistles	C
Knapweed (spotted, diffuse, Russian)	P to C
Tarweeds (except Hemizonia pungens)	C
Ragweed (Ambrosia spp.)	C
Mayweed (Anthemis cotula)	C
Sagebrush (Artemisia spp.)	C
Pineappleweed (Chamomilla suaveolens)	C
Oxeye daisy (Chrysanthemum leucanthemum)	C
Chicory (Cichorium intybus)	C
Horseweed and marestail (Conyza spp.)	C
Sunflower (Helianthus spp.)	C
Prickly lettuce (Lactuca serriola)	P to C
Common groundsel (Senecio vulgaris)	C
Dandelion (Taraxacum officinale)	P to C
Salsify (Tragopogon spp.)	C
Cocklebur (Xanthium strumarium)	C

Appendix C

Presentation of WeedRIC to the Weed Workgroup

What is WeedRIC?

The Weed Research and Information Center is an interdisciplinary collaboration that fosters research in Weed management and facilitates distribution of associated knowledge for the benefit of agriculture and for the preservation of natural resources. Why was WeedRIC formed?

The economic, sociological and environmental impacts from weeds affect an extremely wide range of clientele groups from homeowners to production agriculture and natural resource managers. These different interest groups lack a single, visible research and technology transfer organization upon which adequate fiscal and administrative support can be focused. In California, the Weed Workgroup, composed of UC faculty and specialists, USDA scientists, Farm Advisors, and Statewide IPM Specialist, represents the strongest, largest, and most diverse weed-management oriented group in the world. Nevertheless, **weed science** as a discipline is not formally recognized at the university level (i.e., department or section). This limits the groups visibility and effectiveness statewide and impedes inter campus and interdepartmental synergy that would optimize research and extension resources in the state.

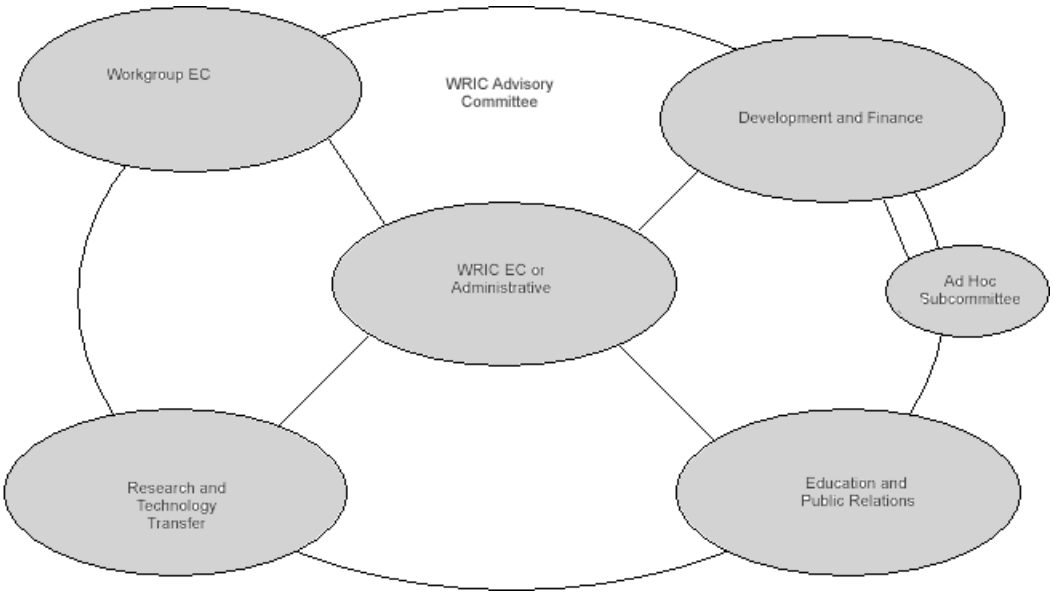
What are WeedRIC's goals?

1. Administratively support research and outreach activities and ensure coordinated and efficient use of all UC science technology resources to meet the mission
2. Build a network of stakeholders in WeedRIC from both inside and outside the university who will support and guide the growth of the program.
3. Provide a focal point for weed science within the University and state
4. Enhance public understanding and awareness of weed related issues
5. Promote visibility and recognition of the Weed Science Program, Vegetable Crops Department, and the University with industry, commodity groups, other researchers and educators both nationally and internationally
6. Develop a stable funding base from private and public agencies
7. To act as a centralized source of weed science related information for use by researchers, Farm Advisors, agricultural consultants, educators, industry, the media, and the general public.

Administrative structure

The Center Director will advised and is supported by an Advisory Committee, (AC) of about 30 people who represent WeedRIC stakeholders both inside and outside the University. Within this AC will be four standing subcommittees. Each subcommittee chair will be elected for two years and will serve on the Executive Committee, (EC). The EC will consist of the four standing subcommittee chairs, two at large members, (seated by vote of the AC), the Center Director, and one of the WeedRIC Program Representatives as non-voting Secretary.

The AC can form subcommittees at will to address various issues, but these will not have a seat on the EC. All members of a subcommittee do not have to be members of the AC. For instance the Weed Workgroup Executive Committee will be invited to be a subcommittee of the WeedRIC Advisory Committee; but all members of the Workgroup will not be on the AC.

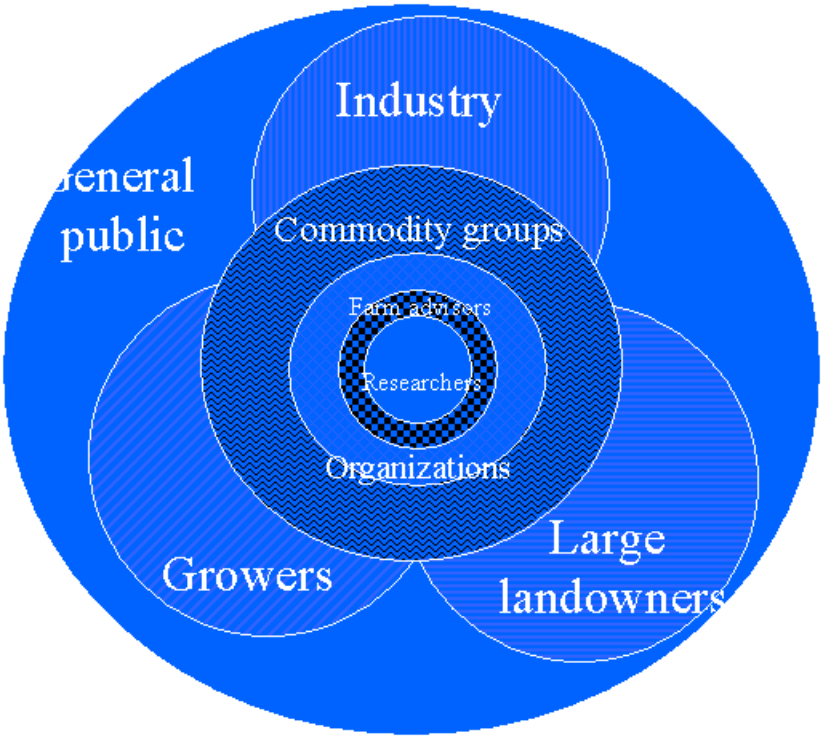


Role of the Workgroup

The Weed Workgroup is the collective voice of all UC weed research and extension. WeedRIC will fail without the guidance and participation of the Workgroup. The Workgroup is a core stakeholder.

The work completed to date is only a framework of the center in the form of a strategic plan and an office and database. But the substance of WeedRIC will be the network of weed researchers, farm advisors, agency people, and industry representatives.

The center will rely on the Workgroup now during this formative stage for advice about goals and objectives, strategies, suggestions for AC candidates, sources of financial support, joint projects, etc.



Appendix D

Short- and Long-Term Services of WeedRIC

Short-term services

1. Directory of researchers
    1.1. biographies
    1.2. photos
    1.3. areas of expertise
    1.4. addresses, tel. no., email
    1.5. publication lists
2. Directory of organizations
3. Directory of expertise
4. Weed identification and poisonous plant information
    4.1. where and how to send specimens
    4.2. photos and brief descriptions
    4.3. link to UC IPM weed ID
5. Herbicide susceptibility charts
6. Link to other homepages
    6.1. UC IPM Guidelines
    6.2. DPR
    6.3. other centers
    6.4. other weed or commodity homepages, e.g., WSSA
7. Calendar of events
    7.1. lectures, symposia, workshops, field days, meetings
    7.2. agendas for meetings
8. Sign-up for meetings
    8.1. Weed School
    8.2. Weed Work Group
    8.3. Weed Day
9. Download scanned publications from homepage
10. Graduate student recruitment information
11. Position announcements
12. Coordinate and establish research collaborations with available funding
13. Columns on commonly asked questions
14. What's new column
    14.1. recent research projects
    14.2. upcoming publication
    14.3. herbicide or biotech releases
    14.4. upcoming weed problems
15. List of funding opportunities and links to appropriate homepages

Long-term services

1. Question/Answer columns
2. Newspaper columns, e.g., Weed Doctor
3. Provide graduate and undergraduate scholarships for research
4. Fund workshops
5. Fund development of brochures

Appendix E

Weed Workgroup Business

Proposed Changes in Program Committee to Weed Work Group

The Weed Work Group will play a key role in the success of the Weed Research and Information Center (WeedRIC). To insure that this group is well represented on the WeedRIC Executive Committee, it is important to develop a more formal Weed Work Group Program Committee, with the chair (two-year term) as an official member of the WeedRIC Executive Committee. Thus, we propose the following changes to the existing structure.

1. An election will be held every other year to select three new members to the Weed Work Group Program Committee. One individual from each of the three UC groups (Cooperative Extension Weed Specialists and Statewide IPM Advisors, UC Academic Senate Faculty and USDA Scientists, and UC Farm Advisors) will be selected at each election.
2. Selected committee members will serve a 4-year term.
3. The committee will select the chair of the committee. The chair will serve in the final two years of his or her term.
4. In addition to assisting in coordinating and moderating the annual Weed Work Group Program, the chair will also serve on the WeedRIC Executive Committee for the same two-year period.

Our current process is to elect two new members to the Weed Work Group Program Committee each year. To transition to the new format, we propose to elect three new members this year (total of 7 committee members in 1998), with no election next year (committee with 5 members in 1999). Three new committee members will again be elected at the 1999 meeting (total of 6 committee members in 2000 and thereafter).

Current committee members and final year of service

Milt McGiffen - 1997
Steve Orloff - 1997
Joe DiTomaso - 1998
Dave Bayer - 1998
Kurt Hembree - 1999
Cheryl Wilen - 1999

1998-2000 committee

1998	**1999**	**2000**
Joe DiTomaso	Kurt Hembree	3 members elected in 1997
Dave Bayer	Cheryl Wilen	3 newly elected members
Kurt Hembree	3 members elected in 1997	
Cheryl Wilen		
3 newly elected members		

UC Academic Senate Faculty and **USDA Scientists**		**UC Specialists** and **Statewide IPM Advisors**	
Anderson	Holt	Cudney	Lanini
Bayer	Norris	DiTomaso	McGiffen
Dean	Spencer	Elmore	Prather
Fischer		Fennimore	Wilen
		Hill	

Weed Workgroup Program Committee
Executive Meeting
November 11, 1997
Minutes

Attending:

Kurt Hembree, Chair	Lars Anderson
Joe DiTomaso	Cheryl Wilen
David Cudney	Kitty Schlosser
David Visher	

Next intramural (workgroup) meeting will be held on November 11-12, 1998 at the Kearny Ag Center.

Proposed Chairs for each commodity group session:

1. Agronomic - Ron Vargas
2. Turf and Vine - Clyde Elmore
3. Vegetable - Carl Bell, Steve Fenimore, Milt McGiffen
4. Non-crop - Joe DiTomaso
5. Aquatic - Lars Anderson
6. Turf / Ornamentals - Cheryl Wilen

Since most of these commodity group sessions comprise several different individual commodities, the chair may decide to appoint individuals to report on specific items. For instance, Ron Vargas who is Chair of Agronomic may invite Albert Fischer to report on Rice.

Possible topics for general session talks:

- PM 10 issue
- Update of WeedRIC
- Fred Hrusa to talk about photo distribution map of A &B weeds
- Accessing weed information on the internet