

# Weed Workgroup Strategic Plan

November 2011

## Introduction

California is recognized as the number one state in agricultural production with the extraordinary diversity of 250 or more crops, many of which require specialized weed management programs. Weeds are the single most important pest group in both conventional and organic cropping systems. In conventional cropping practices, herbicides represent between 60 and 70% of all pesticides applications. In addition to cropping systems, invasive weeds are also the most important problem of wildlands, aquatic sites, and other non-crop areas. Wildlands in California represent 60% of the surface area of the state and include aquatic areas, wetlands, rangelands, forests, woodlands, deserts, coastal dunes and other regions. Invasive plants have been reported to be one of the leading causes of habitat loss and reductions in biodiversity.

The Weed Workgroup represents one of the oldest and largest of the working groups in University of California Division of Agriculture and Natural Resources (ANR). Although it was formally called the Weed Intramurals, it was ratified as the Weed Workgroup in the 1990s.

The Weed Workgroup, comprised of UC Davis and UC Riverside teaching faculty, Cooperative Extension Specialists, Farm Advisors, and other affiliates (e.g., USDA-ARS, and other California State University faculty), have long been recognized for developing many fundamental and applied weed science concepts and solutions. The emphasis on sustainable agricultural production systems and natural areas invasive plant issues will mandate the development of novel approaches to weed management in many regions of the state. Since 1997, the Weed Research and Information Center (WeedRIC) has played an important role in disseminating outreach materials to stakeholders and the general public.

## Goals of the Strategic Plan

The objective of this five year strategic plan for the Weed Workgroup is to address high priority activities in the present and in future years, as well as determine critical weed science topics to address and personnel gaps to fill in the next five to 10 years. In addition, the Workgroup evaluates potential strategies for working more closely with ANR and the UC IPM program, while developing a more sustainable self-funded approach for WeedRIC in relation to the workgroup.

## Current Priority Weed Workgroup Activities

1. **Susceptibility chart:** The Workgroup should continue to expand the susceptibility chart developed several years ago. While the susceptibility chart can be very useful, there are many information gaps, including missing herbicides and weeds. In addition, the chart is lacking most of the invasive non-crop weeds within the state. The susceptibility chart needs to be more closely linked to the UC IPM program. The information can also be linked to the interactive weed identification site, located on the WeedRIC website. It needs to be easily accessible and useable. The Workgroup needs to consider linking the information to label and registration information, Pest Management Guidelines, mode of action information, and herbicide resistance information. These improvements should increase the Weed Workgroup's visibility, through increased visits to the website. It is also possible to obtain some funding to maintain this site. To achieve this, it will be necessary for the Workgroup to establish a subcommittee with this as their primary task.

2. **Interactive symptomology diagnosis program:** Current or retired Weed Workgroup members (e.g., Lanini, Elmore, Hanson, and Al-Khatib) have accumulated close to 5000 slides on different herbicide, nutrient, and abiotic plant symptoms on a variety of species, including numerous crops. An interactive symptomology diagnostic program can be developed where each slide is linked with key words that can include plant species or common name, plant group (i.e., orchard crop, broadleaf weed, etc.), herbicide or other cause of symptom, mode of action, chemical class, and category of the symptom (i.e., chlorosis, leaf cupping, deformed growth, etc.). A website should be established that allows the user to select multiple options from several categories that will show photos related to their request. It is important to indicate, through a disclaimer, that this is not comprehensive and only represents available photos that match their selections. Other non-herbicidal conditions or other herbicides could give similar symptoms. This diagnostic program should be on the WeedRIC website, but again linked with the UC IPM website. This site should be thoroughly tested within the Workgroup before becoming available to the general public or applicators. A subcommittee of the workgroup should be formed to complete this task.
3. **Publications:** There are several publications that need to be developed in the next couple of years. Perhaps the most important Pest Notes to produce is the Management of Aquatic Weeds in Ponds. There are other Fact Sheets, Pest Notes, or 8000 Series publications that also need to be developed, including cutleaf primrose, urban weed management, calibration and application technology, glyphosate safety, and an update of the *Biology and Management of Horseweed and Hairy Fleabane in California* and *Herbicide Resistance: Definition and Management Strategies* 8000 Series publications. In addition, a high priority would be to develop an electronic method of retrieving publications, research progress reports, or other research findings through the WeedRIC website. The Workgroup needs to consider how we may be able to do this using smart phone app technology. Like the symptomology diagnostic program, reports and research results could be obtained by linking keywords to each paper and retrieving documents from the website through an internal keyword search.
4. **Short-term position fills:** In 2011, UC Riverside was approved to hire an Urban Landscape CE Specialist position. UC Davis was also approved of a CE Specialist position in the Department of Plant Sciences for Restoration Ecology. This position, while not emphasizing weed management, will likely include some aspect related to invasive plants. There was no specific Farm Advisor positions in 2011 or spring 2012 focused on weed management. It is a key role of the Weed Workgroup to submit critical needs position in future calls.
5. **Future structure of the Weed Workgroup meeting:** Weed Workgroup meetings in the future will focus on major projects and new initiatives. We will not use traditional breakout sessions to discuss individual commodities. These reports can be made available on the WeedRIC website with searchable capability.

## Weed Research and Information Center

The Weed Research and Information Center (WeedRIC), which began in 1997, will be the primary centralized outreach site for the Weed Workgroup. As counties begin to cluster and each county not only loses its resources, but also its individual county identity, it will become more important to consolidate our resources and ability to disseminate information on weed management. Furthermore, Farm Advisors have taken on more statewide roles where they not only conduct research in multiple counties, but the results of their research are applicable to stakeholders far beyond the boundaries of their individual county or counties. Among other informational contents, WeedRIC currently has developed a statewide interactive weed identification program, several videos directed at training for the Master Gardener program with others being developed for professional applicators, and a UC Weed

Science blog that provides current results and information on weed related topics. To be successful, it will be critical for all members of the Workgroup to contribute to WeedRIC. This includes contributions on research and educational materials, as well as interactive programs and the blog. It is also important that WeedRIC maintain close ties with the UC IPM program and their website, as well as the county-based information and their websites. WeedRIC needs to be the primary site for weed information dissemination in the state of California. The Workgroup will set up a WeedRIC subcommittee to evaluate the website and the strategy for improving its usefulness and efficiency.

## **Strategic Planning for Next Five Years**

The strategic planning process addressed five questions.

1. Where are personnel gaps in the next 5 to 10 years?
2. How should the Weed Workgroup tie into ANR activities in the future?
3. What are the critical weed science topics to address in California in the next 5 to 10 years?
4. What is the role of Weed RIC in relation to the workgroup?
5. How can Weed RIC and UC IPM complement each other?

### ***1. Where are personnel gaps in the next 5 to 10 years?***

All regions of the state and all positions were considered, including Teaching Faculty, CE Specialists and Farm Advisors. The ranking is based on current gaps in expertise in weed science and anticipated gaps in the next few years based on expected retirements. Each category (e.g. Teaching Faculty, CE Specialists and Farm Advisors) were ranked by the Workgroup in order of importance, based on current criteria.

For Teaching Faculty, four positions were identified based on discipline and ranked in the following order: 1) IPM principles and practices, 2) Weed Physiology, 3), Weed Ecology, and 4) Weed Genomics.

For CE Specialists, six positions were identified as important, with three ranking as highest priority. These included a Specialist in 1) Vegetable Crops Weeds at UC Davis, 2) Aquatic Weeds at UC Davis, and 3) Turf and Ornamental Weeds at UC Davis. The other three Weed Specialists included a 4) Vegetable Crops Weed Scientist at UC Riverside, 5) Wildlands Weed Scientist at UC Riverside, and 6) an Agronomic Crops Weed Scientist at UC Davis.

There were numerous Farm Advisor positions identified as critical to the Weed Workgroup in the future. These were categorized by region and by area of expertise, with five areas of expertise considered important. Ranking was conducted only by area of expertise, with regions needed in parentheses. The two areas that were clearly ranked the highest in priority were Farm Advisors in the area of Vegetable Crop production (Desert, Central Coast, and San Joaquin Valley) and Urban Weed Management (South Coast, Central Coast, San Joaquin Valley, and Sacramento Valley). The three other, though considered important, were ranked equally, but not as high. These include Farm Advisors in the areas of Trees and Vines (Central Coast, San Joaquin Valley, Sacramento Valley, and North Coast), Agronomic Crops (Desert, San Joaquin Valley, Sacramento Valley, and North Region), and Wildlands (Desert, South Coast, Central Coast, San Joaquin Valley, North Coast, and North Region).

### ***2. How should the Weed Workgroup tie into ANR activities in the future?***

In addition to the consolidation of the Weed Workgroup within the ANR IPM Program Team, there are many aspects of ANR that are closely linked to the Workgroup and WeedRIC activities. This includes the Master Gardener Program, Communication Services (training and program development), Events Planning, and Curriculum and Website Development and possibly maintenance. The goal is to synergize

our efforts and capitalize on the resources available to the Workgroup through ANR. The workgroup identified the role of ANR Communication Services as critical to the future outreach capabilities of the Workgroup. This included social media capabilities such as developing apps for educational materials, including the interactive weed identification site, the symptomology site, and others Weed Workgroup projects. As a second priority, the Workgroup also felt that Communication Services could play a major role in training or assisting Cooperative Extension personnel in the production of educational videos (e.g., YouTube clips on individual plant management) and photography. It was also felt that the Workgroup could strengthen our integration with ANR, yet maintain our identity, by enhancing and expanding the WeedRIC brand (which may have to change its name) throughout the state. Other ANR integration areas that were ranked of lesser importance included the development of a standard Master Gardener training program for weed management, assistance in WeedRIC website management and development, provide program support for large educational events, assist in 4-H curriculum development, and serve as a repository for digital resources that are used in Master Gardener training programs.

### ***3. What are the critical weed science topics to address in California in the next 5 to 10 years?***

The Workgroup considered the most important issues that will face the state in the area of weed science within the next decade. These included areas or topics that will be important for new or continued research and outreach and fit with the expertise and resources of the Workgroup members. Numerous topics were identified as critical to California in the future. These were synthesized into seven general areas and were ranked by the Workgroup.

The area considered the primary importance for Weed Workgroup focus was Integrated Pest Management (IPM). This includes pest interactions in cropping systems, and the development of non-chemical weed control strategies. In particular, increased research will need to be focused on lower inputs and the development of mechanical, sustainable, organic weed control options, and other aspects related to improving application technology for weed management. While this can apply to all crops, it is most critical to vegetable cropping systems.

A second area of important will be in preventing and managing herbicide resistant weeds. What species are likely to develop, how to we education growers on prevention and management strategies, how do we prevent the development and spread of herbicide resistant weeds in the future particularly with respect to the widespread use of genetically engineered herbicide resistant crops, what affect will climate change have on the development of herbicide resistance in weeds?

The third priority area deals with the introduction, spread and management of invasive plants, including terrestrial, riparian and aquatic species. Important topics to address include developing prevention strategies, which are related to the introduction of potential invasive plants (nursery industry and other pathways), monitoring spread, establishing an effective early detection and rapid response program, and developing effective management strategies utilizing IPM approaches. Another important aspect of invasive plant management is the development of sustainable restoration programs for degraded landscapes.

The fourth priority of the Weed Workgroup is in the area of environmental safety and risk, particularly with regard to herbicide use. This includes air and water quality issues associated with volatile organic compounds (VOC), surface and ground water contamination, the carbon footprint of weed management strategies, and herbicide additives and active ingredients. Equal in priority to environmental safety and

risk is the application of weed ecological principles in the development of more effective weed management approaches for both agricultural and non-crop environments.

Although important, lower priority was given to the development and extension of information, particularly in light of the limiting resources available to ANR. And finally, it was also considered important to consider the societal impact of weeds or weed management systems, including labor issues and economic cost of crop production systems, genetically engineered crops and the associated public perception and acceptability, and the societal cost of weeds and their control.

#### ***4. What is the role of WeedRIC in relation to the workgroup?***

An integral part of the function and outreach capability of the Weed Workgroup is the Weed Research and Information Center (WeedRIC). The future effectiveness of the Workgroup will depend upon the delivery of information to targeted audiences, which include academics, educators, policymakers, stakeholders, the media, and the general public.

Eight priority areas were considered where WeedRIC could play a key role in the success of the Workgroup. Of these, three were of highest priority. These included 1) the ability of WeedRIC to facilitate the UC Weed Science continuum for research, outreach and teaching among the three entities within the system (i.e., Teaching Faculty, CE Specialists, and Farm Advisors). Of equal importance was the need for an information source to the Weed Workgroup members. The third high priority area was to provide a primary source of weed science information to stakeholders, clientele, the public and other groups mentioned above.

Other areas that were considered important included linking WeedRIC to the UC IPM website and their programs, ensuring that WeedRIC was the primary source for objective science-based information on weed related topics, make available an avenue for faculty to disseminate outreach information beyond scientific journals (including an interactive forum for exchange of information), become self-sustainable and well-funded to allow for a program developer that will maintain a up-to-date website with robust content, and finally to track the use of the website to determine interest levels of users, thus allowing the Workgroup to adjust its priorities in a dynamic way.

#### ***5. How can WeedRIC and UC IPM complement each other?***

Because the UC IPM website receives very high levels of viewing each day, it is in the best interest of WeedRIC and the Weed Workgroup to align as closely as possible to the UC IPM program. However, the Weed Workgroup felt strongly that though there should be very close ties between WeedRIC and the UC IPM program, it was also important to maintain our independence and brand name. Where we do integrate, it should be seamless on all mutually exclusive issues. It was also felt that duplication of effort should be avoided.

### **Potential Funding Sources for WeedRIC**

To be self-supporting, WeedRIC will be required to develop several revenue generating sources. In the long-term, it is the desire of the group to expand beyond events planning and website maintenance to increase our capacity in the area of program development. This will require greater funding support. Currently, WeedRIC is partially funded by an endowment through the Department of Plant Sciences at UC Davis and also through revenues generated by the Weed Science School and the Aquatic Weed School. The Workgroup should also consider developing other educational programs to generate revenue, including the potential of an Organic Pest Control Program. New sources of funding will be

provided to the Weed Workgroup from sales of a new book entitled “Weed Control Handbook for Natural Area Weeds in the Western United States.” WeedRIC will be the publisher of the book and handle all sales. The book is expected to be in print in 2012. In addition, there is also potential endowment funding that has been bequeathed to the Workgroup by a former member of the weed group.