Cooperative Extension University of California Ventura County

Landscape Notes

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Coming Attraction

Here is a free ½ day opportunity to increase your basic horticulture and pest management knowledge of ornamental plants. The Basic Horticulture Seminar is available for professionals in the landscape industry and to Master Gardeners for continuing education credits. Pest Control Advisors and Operators can receive 3 hours of credit.

The meeting will be held on September 24, 8:30 am to 12:00 noon, at the U.C. Cooperative Extension Large Meeting Room, 1st Floor. Since space is limited, please pre-register by calling 805) 645-1434. Seating is available on a first come first served basis.

The following topics will be covered at this meeting: Diagnostic principles (Jim Downer); Color in the landscape (Don Rogrigues); Diagnosing soil related problems, nutritional and fungal (Ben Faber), Diagnosing citrus landscape problems (Nick Sakovich, Farm Advisor), and special updates on oleander scorch, eucalyptus borer, fire ant, pine pitch canker, and giant whitefly. Refreshments will be provided, but lunch is on your own!

A new pest insect of *Eucalyptus citriodora*

Eucalyptus trees in Southern California have been under assault from a constant barrage of new pest insects. Here is yet another arrival to plague *Eucalyptus* in our landscapes. The insect is an unidentified species of *Epichrysocharis*, a tiny wasp in the Eulophidae family. These wasps are usually known for their beneficial characteristics. Wasps in the Eulophidae family are usually internal or external parasites of eggs, larvae, or pupae of flies, moths and other wasps. They may also parasitize mites, spiders, scale insects and thrips. Adult wasps are small, usually 1/25" (1mm) or larger. The adults of *Epichrysocharis* are very small, just under 1mm, and are unique because they parasitize eucalyptus trees.

The *Epichrysocharis* that attacks *E. citriodora* only attacks this species of eucalyptus. It was discovered in Los Angles County this year (March 1999) and has spread south to Orange County and San Diego County and northward as far as Santa Barbara County. The damage looks like a classical Oedema or pimple-like swellings on the mature foliage. The raised chambers house a developing wasp. The wasp lays eggs under the epidermis of the leaf and then a pimple-like gall will form. The galls are red to purple in color and cover the leaves, giving foliage a roughened surface. When wasp larvae mature and hatch, they leave a small circular exit hole in the gall.

Epichrysocharis spp. is not a threat to the health of *E. citriodora.* It is however, a cosmetic nuisance. There is no known treatment and little hope of finding one. Attention has been more appropriately focused on the Red Gum Lerp Psyllid that is now devastating Red Gum (*E. camaldulensis*) in Southern California (for further details on Lerp Psyllids see Landscape Notes Vol. 14, No. 2). Little is known about control of Lerp Psyllids but there are reports that Merit® applications have given control. Yet, this is only anecdotal evidence and no replicated research has been conducted. Biological control of this pest is an obvious goal.
Visit the following Web Site for more information:
http://cnr.berkeley.edu/biocon/dahlsten/rglp/RLP_Main.htm

Where have all the flowers gone?

Are your bedding plants dying in landscapes soon after you plant them? If you are experiencing bedding plant melt down, it may be due to a variety of fungal pathogens that come with the plants from nurseries or are already resident in your color beds. There are many kinds of fungi that attack the wide diversity of bedding plants that we grow in landscapes. Although nurseries strive for pest and disease free stock, there are always a few sick plants that slip through unnoticed.

We are interested in doing research on biological control of soil-borne fungal pathogens in color beds. If you have a site that is constantly diseased and would like to participate in this research give me a call at (805) 645-1458.

Roundup—The DDT of the Nineties?

In recent months I have heard more than one comment that Roundup®, or glyphosate (its active ingredient), or surfactants within the Roundup product cause cancer, kill soil, harm birds, deplete earthworms, and generally despoil the environment. Certainly given the current unpopularity of this herbicide in the eyes of the general public, more studies are warranted to provide assurance that we are not contaminating the world with "the DDT of the nineties". Because of its utility, glyphosate is one of the most frequently applied herbicides in California. It provides nonselective control of grasses and broadleaf weeds along much of California's highway right-of-ways. Glyphosate is also a primary weapon in the fight against *Arundo donax*, a pernicious weed in our streams and creeks. As with many chemicals, the use of Roundup must be considered in a risk benefit manner. Are the risks of use worth the benefits of the application? Despite the current fervor over the use of glyphosate, it is legally registered for use in California landscapes and much is known about its chemistry, activity and toxicology. The following was gleaned from the Extension Toxicology Network.

Glyphosate

∃*Trade and Other Names*: Trade names for products containing glyphosate include Gallup, Landmaster, Pondmaster, Ranger, Roundup, Rodeo, and Touchdown. It may be used in formulations with other herbicides.

∃*Regulatory Status*: Glyphosate acid and its salts are moderately toxic compounds in EPA toxicity class II. Labels for products containing these compounds must bear the Signal Word WARNING. Glyphosate is a General Use Pesticide (GUP).

∃*Chemical Class*: Not Available

∃*Introduction*: Glyphosate is a broad-spectrum, nonselective systemic herbicide used for control of annual and perennial plants including grasses, sedges, broad-leaved weeds, and woody plants. It can be used on non-cropland as well as on a great variety of crops. Glyphosate itself is an acid, but it is commonly used in salt form, most commonly the isopropylamine salt. It may also be available in acidic or trimethylsulfonium salt forms. It is generally distributed as a water-soluble concentrate and powder. The information presented here refers to the technical grade of the acid form of glyphosate, unless otherwise noted.

∃*Formulation*: Glyphosate itself is an acid, but it is commonly used in salt form, most commonly the isopropylamine salt. It may also be available in acidic or trimethylsulfonium salt forms. It is generally distributed as water-soluble concentrates and powders.

Toxicological Effects:

•*Acute Toxicity*: Glyphosate is practically nontoxic by ingestion, with a reported acute oral LD50 of 5600 mg/kg in the rat. The toxicities of the technical acid (glyphosate) and the formulated product (Roundup) are nearly the same [58,96]. The oral LD50 for the trimethylsulfonium salt is reported to be approximately 750 mg/kg in rats, which indicates moderate toxicity [58]. Formulations may show moderate toxicity as well (LD50 values between 1000 mg/kg and 5000 mg/kg) [58]. Oral LD50 values for glyphosate are greater than 10,000 mg/kg in mice, rabbits, and goats [8,96]. It is practically nontoxic by skin exposure, with reported dermal LD50 values of greater than 5000 mg/kg for the acid and isopropylamine salt. The trimethylsulfonium salt has a reported dermal LD50 of greater than 2000 mg/kg. It is reportedly not irritating to the skin of rabbits, and does not induce skin sensitization in guinea pigs [58]. It does cause eye irritation in rabbits [58]. Some formulations may cause much more extreme irritation of the skin or eyes [58]. In a number of human volunteers, patch tests produced no visible skin changes or sensitization [58]. The reported 4-hour rat inhalation LC50 values for the technical acid and salts were 5 to 12 mg/L [58], indicating moderate toxicity via this route. Some formulations may show high acute inhalation toxicity [58]. While it does contain a phosphatyl functional group, it is not structurally similar to organophosphate pesticides which contain organophosphate esters, and it does not significantly inhibit cholinesterase activity [1,58].

•*Chronic toxicity*: Studies of glyphosate lasting up to 2 years, have been conducted with rats, dogs, mice, and rabbits, and with few exceptions no effects were observed [96]. For example, in a chronic feeding study with rats, no toxic effects were observed in rats given doses as high as 400 mg/kg/day [58]. Also, no toxic effects were observed in a chronic feeding study with dogs fed up to 500 mg/kg/day, the highest dose tested [58,97].

•*Reproductive effects*: Laboratory studies show that glyphosate produces reproductive changes in test animals very rarely and then only at very high doses (over 150 mg/kg/day) [58,96]. It is unlikely that the compound would produce reproductive effects in humans.

•*Teratogenic effects*: In a teratology study with rabbits, no developmental toxicity was observed in the fetuses at the highest dose tested (350 mg/kg/day) [97]. Rats given doses up to 175 mg/kg/day on days 6 to 19 of pregnancy had offspring with no teratogenic effects, but other toxic effects were observed in both the mothers and the fetuses. No toxic effects to the fetuses occurred at 50 mg/kg/day [97]. Glyphosate does not appear to be teratogenic.

•*Mutagenic effects*: Glyphosate mutagenicity and genotoxicity assays have been negative [58]. These included the Ames test, other bacterial assays, and the Chinese Hamster Ovary (CHO) cell culture, rat bone

marrow cell culture, and mouse dominant lethal assays [58]. It appears that glyphosate is not mutagenic.

•*Carcinogenic effects*: Rats given oral doses of up to 400 mg/kg/day did not show any signs of cancer, nor did dogs given oral doses of up to 500 mg/kg/day or mice fed glyphosate at doses of up to 4500 mg/kg/day [58]. It appears that glyphosate is not carcinogenic [97].

•*Organ toxicity*: Some microscopic liver and kidney changes, but no observable differences in function or toxic effects, have been seen after lifetime administration of glyphosate to test animals [97].

•*Fate in humans and animals*: Glyphosate is poorly absorbed from the digestive tract and is largely excreted unchanged by mammals. At 10 days after treatment, there were only minute amounts in the tissues of rats fed glyphosate for 3 weeks [98]. Cows, chickens, and pigs fed small amounts of glyphosate had undetectable levels (less than 0.05 ppm) in muscle tissue and fat. Levels in milk and eggs were also undetectable (less than 0.025 ppm). Glyphosate has no significant potential to accumulate in animal tissue [99].

Ecological Effects:

•*Effects on birds*: Glyphosate is slightly toxic to wild birds. The dietary LC50 in both mallards and bobwhite quail is greater than 4500 ppm [1].

•*Effects on aquatic organisms*: Technical glyphosate acid is practically nontoxic to fish and may be slightly toxic to aquatic invertebrates. The 96-hour LC50 is 120 mg/L in bluegill sunfish, 168 mg/L in harlequin, and 86 mg/L in rainbow trout [58]. The reported 96-hour LC50 values for other aquatic species include greater than 10 mg/L in Atlantic oysters, 934 mg/L in fiddler crab, and 281 mg/L in shrimp [58]. The 48-hour LC50 for glyphosate in Daphnia (water flea), an important food source for freshwater fish, is 780 mg/L [58]. Some formulations may be more toxic to fish and aquatic species due to differences in toxicity between the salts and the parent acid or to surfactants used in the formulation [58,96]. There is a very low potential for the compound to build up in the tissues of aquatic invertebrates or other aquatic organisms [96].

•*Effects on other organisms*: Glyphosate is nontoxic to honeybees [1,58]. Its oral and dermal LD50 is greater than 0.1 mg/ bee [98]. The reported contact LC50 values for earthworms in soil are greater than 5000 ppm for both the glyphosate trimethylsulfonium salt and Roundup [58].

Environmental Fate:

•*Breakdown in soil and groundwater*: Glyphosate is moderately persistent in soil, with an estimated average half-life of 47 days [58,11]. Reported field half-lives range from 1 to 174 days [11]. It is strongly adsorbed to most soils, even those with lower organic and clay content [11,58]. Thus, even though it is highly soluble in water, field and laboratory studies show it does not leach appreciably, and has low potential for runoff (except as adsorbed to colloidal matter) [3,11]. One estimate indicated that less than 2% of the applied chemical is lost to runoff [99]. Microbes are primarily responsible for the breakdown of the product, and volatilization or photodegradation losses will be negligible [58].

•*Breakdown in water*: In water, glyphosate is strongly adsorbed to suspended organic and mineral matter and is broken down primarily by microorganisms [6]. Its half-life in pond water ranges from 12 days to 10 weeks [97].

•*Breakdown in vegetation*: Glyphosate may be translocated throughout the plant, including to the roots. It is extensively metabolized by some plants, while remaining intact in others [1].

Physical Properties:

•*Appearance*: Glyphosate is a colorless crystal at room temperature [1].
•*Chemical Name*: N-(phosphonomethyl) glycine [1]
•*CAS Number*: 1071-83-6
•*Molecular Weight*: 169.08
•*Water Solubility*: 12,000 mg/L @ 25 C [1]
•*Solubility in Other Solvents*: i.s. in common organics (e.g., acetone, ethanol, and xylene) [1]
•*Melting Point*: 200 C [1]
•*Vapor Pressure*: negligible [1]
•*Partition Coefficient*: -3.2218 - -2.7696 [58]
•*Adsorption Coefficient*: 24,000 (estimated) [11]

Exposure Guidelines:

•*ADI*: 0.3 mg/kg/day [12], •*MCL*: Not Available
•*RFD*: 0.1 mg/kg/day [13], •*PEL*: Not Available
•*HA*: 0.7 mg/L (lifetime) [98], •*TLV*: Not Available

Basic Manufacturer:

Monsanto Company
800 N. Lindbergh Blvd., St. Louis, MO 63167
Phone: 314-694-6640 •Emergency: 314-694-4000

References:

References for the information in this PIP can be found in Reference List Number 10. They can be obtained through EXTOXNET on the world wide web at **http://ace.ace.orst.edu/info/extoxnet/.**

EXTOXNET is a Pesticide Information Project of Cooperative Extension Offices of Cornell University, Oregon State University, the University of Idaho, and the University of California at Davis and the Institute for Environmental Toxicology, Michigan State University. Major support and funding was provided by the USDA/Extension Service/National Agricultural Pesticide Impact Assessment Program. EXTOXNET primary files maintained and archived at Oregon State University.

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