# Trial of several herbicides and application techniques for control of *Ailanthus altissima*, upper Putah Creek, Yolo County

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*Ailanthus forest with an understory of root sprouts and seedlings (left).*

*Odiferous glands at the base of the leaflets help to identify Ailanthus (right). The leaves smell somewhat like rancid peanut butter.*

## Introduction

During October 2001 we tested several treatment methods using three herbicides for control of *Ailanthus altissima* (tree-of-heaven) along Putah Creek in Yolo County, California. Treatments were made shortly before *Ailanthus* leaf drop. Herbicides tested were Chopper® (imazapyr), Garlon 4® (triclopyr ester), and Roundup Pro® (glyphosate). Methods included the following:

Cut stump. In cut stump applications, the tree is cut down and herbicide is applied to the cut surface of the stump. At the moment of cutting, the tree xylem withdraws from the cut surface and the wound begins to suberize, so presumably the stump should be treated as soon as possible. Some applicators have treated the entire surface, but this is unnecessary; only the cambium (the outer ring next to the bark) is alive.

Hack and squirt. The tree is not cut down, but a wound is made in the bark, usually with a hatchet, and undiluted herbicide is dribbled into the wound. The tree remains physiologically active, distributing the herbicide throughout its canopy and root system. This treatment requires minimal equipment and is advantageous in situations where managers might want to leave dead trees standing. In previous studies we found that Chopper effectively controls tree-of-heaven when applied this way. Roundup Pro is registered for this use but we have not tested it previously. Garlon 4 is not registered for this use, but we decided to test it based on its effectiveness in other low volume applications.

Cut and hack. The tree is cut down, and a hack and squirt treatment is applied to the standing stump. By combining aspects of cut stump with hack and squirt treatments, we hoped to gain some advantages from each method. We thought that by using hack and squirt to introduce herbicide to the living tissue of the lower stump, we might be able to extend the application window after cutting the tree. This would be advantageous in situations where cutting and treatment operations are performed by separate teams.

Basal bark. Herbicide, usually mixed with an oil carrier, is sprayed or painted onto the basal 12 to 18 inches of the tree. Like hack and squirt, this treatment leaves the tree standing. Both Chopper and Garlon 4 are registered for this use and have been used successfully against other species.

Drizzle application. "Drizzling," or application with a spray gun fitted with an orifice disk, has been used effectively against other species in Hawaii. This method can be used for either foliar or bark applications (the latter are sometimes called thin-line treatments).

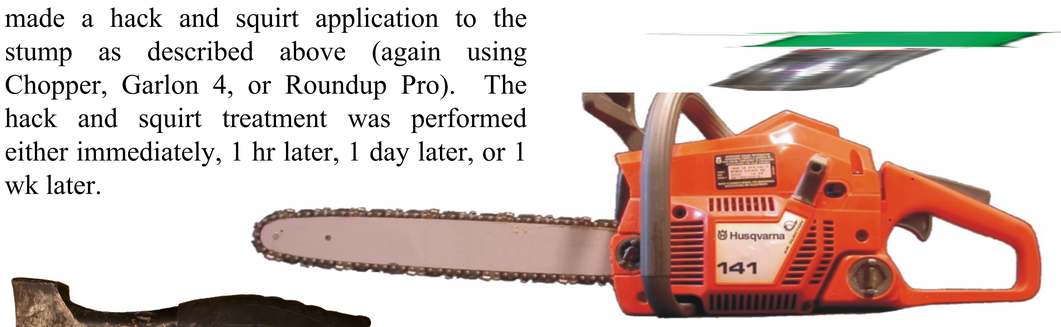
## Materials and methods

We chose 3 sizes of trees (trunks < 3" in diameter, trunks > 3", and multiple trunks), total of 6 to 8 trees per treatment. At least 2 trees from each size category were included in each treatment. We organized treatments into complete randomized blocks. In all, 234 trees were marked with plastic flagging and numbered with aluminum tags.

Cut stump. We cut trees at 24 inches using a chainsaw, then treated the stump cambium with herbicide solution (20% Chopper in Hasten crop oil, 20% Garlon 4 in Hasten, or 50% Roundup Pro in water). We applied herbicides using a laboratory squeeze bottle to wet the entire cambium, using an average of 7 ml solution per stump. This was enough solution to wet the cambial ring short of runoff. Stumps were treated at 4 intervals after cutting (immediately, 15 min, 30 min, and 60 min after cutting).


Hack and squirt. We used a hatchet to make 2" to 3" horizontal hack marks in tree trunks 12" to 18" from the ground. We made one mark for each 3" in trunk diameter (i.e., 1 mark for trunks < 3", 2 marks for trunks 3" to 6", and so on). Into each hack mark we dribbled 1 ml of undiluted herbicide (Chopper, Garlon 4, or Roundup Pro).

Cut and hack. We cut trees at 24 inches, then made a hack and squirt application to the stump as described above (again using Chopper, Garlon 4, or Roundup Pro). The hack and squirt treatment was performed either immediately, 1 hr later, 1 day later, or 1 wk later.




Basal bark. Chopper (20% in Hasten) or Garlon 4 (20% in Hasten) was applied to the basal 18" of trunks using a bottle sprayer. Trunks were sprayed to wet but not to runoff. We applied an average of 50 ml of solution to each tree.

Drizzle application. In adjacent areas (not part of the main study), we used a spray gun with an orifice disk nozzle to apply 20% Garlon 4 in Hasten to the young sapling understory. We applied 8 to 10 stripes per plot (~6 gal/acre spray solution). Chopper was not used in this treatment because it is less selective and has soil activity, and with this treatment there is the likelihood of accidental off-target application.