

**Title of project:** Alternative Herbicide Trials

**Project leaders:** Matthew Walker (intern), Elizabeth Lamb, Brian Eshenaur

**Cooperators:** Debra Marvin

**Abstract:**

Two alternative herbicides, vinegar based AllDown and clove oil based BurnOut II, were compared to hand weeding under home garden conditions. Trials were run in Geneva and Rochester, with 3 replicates in each test. While both result in rapid burning of foliage, neither product was consistently or dramatically better than hand weeding in controlling perennial weeds. BurnOut II was more effective than AllDown in all trials.

**Justification:**

A number of alternative herbicides have come on the market, which purport to be more 'natural' and safer for the environment. Most are contact herbicides with no translocation to the roots. Those that list weeds to be controlled emphasize annuals but do include some perennials as controllable. Research on efficacy is usually done in a commercial setting with Round-up, a systemic herbicide, as a control. This test was intended to compare AllDown and BurnOut II, in a home garden setting, to hand weeding as a control. AllDown is vinegar based with garlic and yucca extracts. BurnOut II is clove oil based, with vinegar as an additional component. Both acetic acid (vinegar) and eugenol (clove oil) affect the plant's cell membranes causing rapid burning of plant tissue on contact.

**Objectives:**

Compare AllDown and BurnOut II to hand weeding to determine if the alternative herbicides are effective for home garden use.

**Procedures:**

Matt Walker, the IPM intern, coordinated the project and did most of the hand weeding and data collection in 2006.

In 2006, plots were set out in Geneva, at the Natives Bed at NYSAES, and in Rochester, in a median strip at the Monroe County Cooperative Extension Service Office. In both locations, there were 3 replicates of each treatment – AllDown, BurnOut II and hand weeding. The plots in Geneva, which were in a flower bed, had approximately equal plant cover. The test area in Rochester had only trees, so was predominantly open area. The 2 herbicides were in a 'ready to apply' formulation which would be typically used by home gardeners. Herbicide applications were made by Debra Marvin in Geneva and Brian Eshenaur in Rochester. Plots were assigned randomly to treatments. Care was taken to get good coverage with the herbicides.

In Geneva, all plots were hand weeded 1 week prior to the first applications of the herbicides, in an attempt to equalize the initial weed pressure. Bindweed and nutsedge were the predominant perennial weeds in the bed. Treatments were to be applied as needed, to get an indication of efficacy. However, significant weed regrowth had occurred within a week in all treatments, so the project plan was changed to weekly applications and evaluations. Evaluation consisted of a count of the weeds in each plot. The first application and evaluation was on June 6 and they continued until August 16. Additional applications

continued into September, without evaluation of weed numbers, as we wanted to know if continued application would result in less weed regrowth in the following year.

In Rochester, the plots were not hand weeded before the first application of herbicide. Queen Anne's lace and nutsedge were the predominant perennial weeds. Treatments were applied every other week. Evaluation was an estimation of percent weed coverage of each plot.

The trial was continued in 2007 to determine if the continued application of the alternative herbicides or hand weeding had a detrimental effect on the survival of perennial weeds. Treatments were applied approximately every 2 weeks, depending on the weather. Evaluation was as percent weed cover.

## **Results**

Both herbicides result in a rapid burn back of treated foliage. Wilting and drying can be seen within minutes. As expected, the 2 alternative herbicides were more effective on annual weeds than on perennial weeds. Therefore weed counts and cover are primarily from perennial weeds after the first application. In all trials, the variation from replicate to replicate and week to week was considerable. However, the overall trends do show some differences. In the 2006 Geneva trials, all three treatments show a general reduction in number of weeds over the course of the project. BurnOut II was better than AllDown or hand weeding at reducing the number of weeds for almost every evaluation, with an overall average of 60 weeds per plot. AllDown (97 weeds per plot) and hand weeding (114 weeds per plot) were more similar in results (Table 1).

In Rochester, AllDown was largely ineffective, with an overall % weed cover of 60% per plot. Hand weeding (17%) and BurnOut II (23%) were similar in control (Table 2).

The 2007 results suggest that repeated herbicide applications in one season do not result in reduced weed cover in the next year. Overall, all three treatments were similar in efficacy. However, BurnOut II (24%) was slightly better than AllDown (30%) and very similar to hand weeding (24%) (Table 3).

While we intended to do a comparison of costs of application, it was difficult to determine a cost of labor for home gardeners where time may not have a cost applied. Both herbicides are relatively expensive, especially in the 'ready to apply' formulation. Need for care in application and good coverage meant that there was not a substantial reduction in time necessary for herbicide application compared to hand weeding. In an open bed, before planting or a situation similar to the Rochester trial, it might be possible to see a reduction in time required for weed control compared to hand weeding, and consequently a possible cost savings.

## **Implications**

Frequency of application and efficacy suggest that the alternative herbicides tested would not be useful in a commercial setting. Even in a home garden, they may be only marginally better than hand weeding and not show a great savings in time. Of the 2 products tested, BurnOut II was more efficacious than all AllDown. Anecdotally, the BurnOut II spray was whitish and easier to see on the leaf tissue and seemed to stick better, likely effects of the oils in the formulation. This resulted in better coverage and consequently, more leaf burning.

The alternative herbicides tested might have some use as an initial treatment to kill the annuals, followed by spot treatments of a systemic product for the persisting perennials. Homeowners insisting on 'natural' products have few herbicides to choose from. It should be noted that not all alternative herbicides (based on vinegar, clove/cinnamon oil, pelargonic acid, or soaps) are labeled for certified organic food crop production. And while many are considered 'least toxic' herbicides, they do require proper handling and can be skin, eye or lung irritants.

Table 1

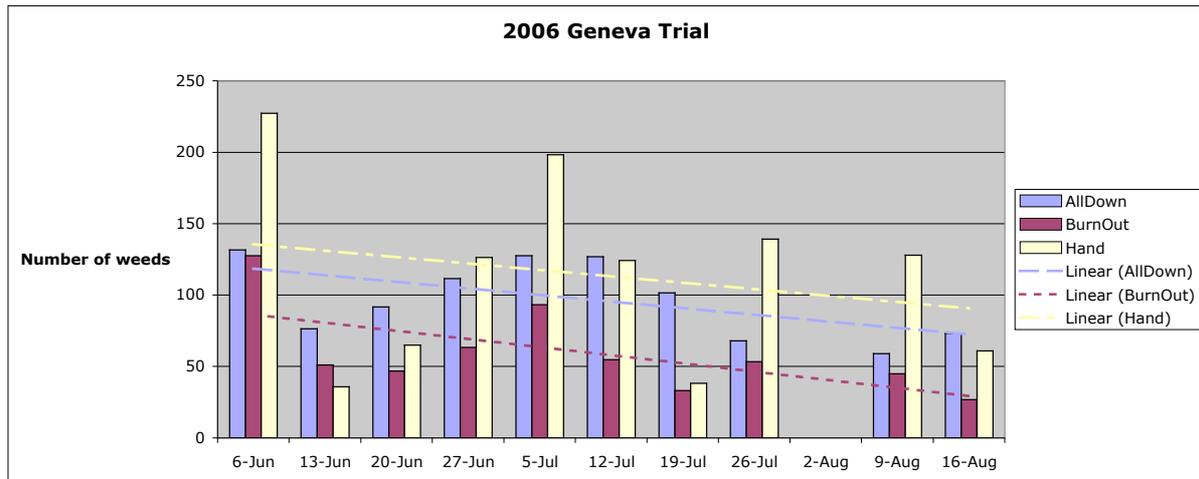


Table 2

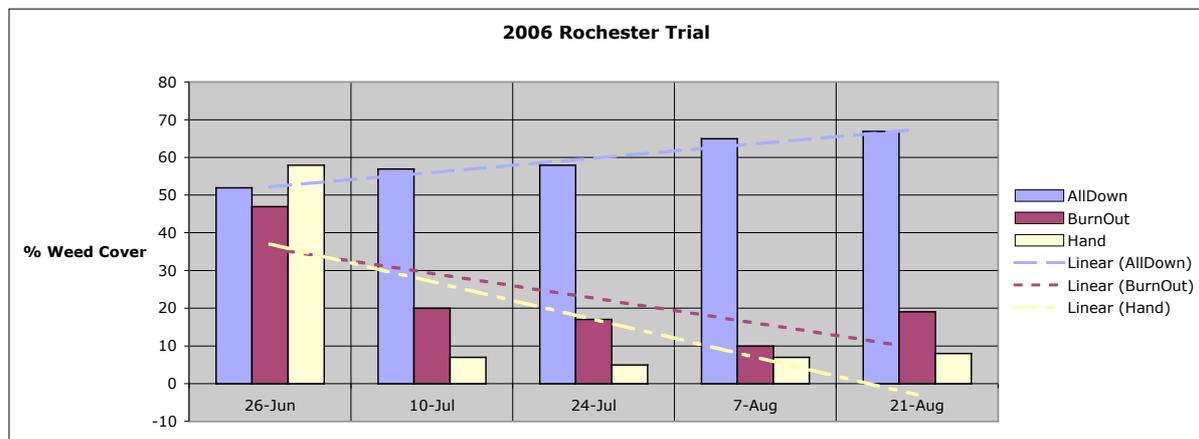


Table 3

