Field Evaluation of Various Herbicide and Mulch Combinations for Ornamental Weed Control

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Significance to the industry. Weed control is essential in the landscape and nursery industry. Weeds not only compete for resources like nutrients, light and space etc., but also reduce the aesthetics of plants in the landscape. Increased production and maintenance costs have continuously been challenging the green industry and weed control is one of the major activities that are a large portion of the production costs. Organic mulches have been widely used by nursery and landscape industry for many reasons, but weed control and soil moisture conservation are of utmost importance. Preemergence herbicides are the backbone of the green industry. The combination of herbicides and mulches can be a potential approach to control weeds for a longer period of time, while reducing the weed control costs and herbicides in the environment. The objective of this study was to evaluate weed control efficacy with previously untested granular herbicides and mulch combinations at various depths of mulching compared to liquid formulations of herbicides combined with mulches. In addition, two new granular + mulch combinations (one of those is commercially available) were evaluated.

Materials and methods. Herbicide treated mulch is an integrated weed management approach in which two or more weed control methods are combined in order to control weeds effectively. Previous studies demonstrated that herbicide treated mulches work effectively in controlling weeds. Fretz (1973), and Fretz and Dunham (1971) reported higher weed control efficacy with herbicide impregnated mulches. Case and Mathers (2006) found that pine nuggets combined with various herbicides provided weed control for up to one year in the field. Mathers (2003) obtained higher weed control efficacy with herbicide treated bark nuggets in containers.

Two types of mulches, hardwood (HW) and pine nuggets (PN), were tried alone at different depths (1, 2.5, and 5 inches) and in combination with Snapshot 2.5TG [isoxaben + trifluralin at 1.0 lb ai/ac + 4 lb ai/ac respectively (Dow AgroSciences, Indianapolis, IN)] or a liquid formulation consisting of Treflan HFP (Dow AgroSciences) + Gallery (Dow AgroSciences) at 1.0 lb ai/ac + 4 lb ai/ac, respectively. The three mulching depths represent the recommended depth (2.5 in), the depth previously evaluated (1 in) and a depth closer approximating what is used in the landscape industry (5 in). Snapshot was directly applied on top of the mulch in the field. The liquid formulation was applied below or above the mulch at each depth and was also used to pretreat the mulches. Mulches were pretreated with herbicides by placing the mulch on a plastic sheet at the depths described above and herbicide was sprayed evenly on top of the mulch and allowed to dry for 48 hours before applying them to field. This experiment was conducted using two different start dates, one starting in October 2007 and another one started in April, 2008, at The Ohio State University's Waterman Agricultural and Natural Resources Laboratory, Columbus, Ohio with a randomized complete block design with five replications. There were a total of 35 treatments including untreated mulches at three depths, herbicides applied alone, two commercially available herbicide treated mulches, and untreated control. Visual ratings were taken at 30, 60, 90 and 120 days after treatment (DAT) for spring experiment and 30, 180, 210 DAT for fall start experiment. Visual ratings were based on a scale of 0 (no weed control) to 10 (complete weed control), with 7 and above commercially acceptable. Two types of analysis were performed. The first analysis compared all 35 treatments. The other one

compared different types of depths, two types of mulch, two types of herbicide formulations, and different application methods (herbicide applied above mulch, herbicide applied below mulch and herbicide treated mulch); however, only herbicide + mulch combinations were used for this analysis. The two methods were analyzed using lsmeans in SAS with $\alpha = 0.05$ to compare treatment differences.

Results and discussion: Data was pooled across all dates for the April start experiment, and pooled over 180 DAT and 210 DAT for the October start. There was not much weed pressure at 30 DAT for the October experiment, so data was not included in this summary. Three treatments provided below commercially acceptable levels of weed control for the October start. They are treflan+gallery (T+G) (liquid formulation of herbicide) without mulch, untreated hardwood at one inch depth, and the untreated control. All other treatments have shown above commercially acceptable levels of weed efficacy (Fig.1). There was not a significant difference in terms of visual ratings between 2.5 inches depth and 5.0 inches depth mulch treatments either alone or with herbicides.

Regarding the April start experiment, there were seven treatments that have shown below commercially acceptable levels of weed control. They are snapshot (granular) without mulch, treflan+gallery (liquid) without mulch, untreated pine nuggets at 1 inch, untreated hardwood at 1 inch, treflan+gallery applied over 1 inch hardwood, snapshot applied over one inch hardwood, and the untreated control. All other treatments including two commercially available herbicide treated mulches provided above commercially acceptable levels of weed control.

There is significant difference of weed control efficacy between the three depths of mulches (fig.2) with both fall and spring experiments across all the dates. Five inch depth mulch has controlled weeds completely in the both fall and spring experiments. Pine nuggets have controlled weeds more effectively than hardwood mulch (Fig.3). When herbicide formulations were compared, granular herbicide have shown better weed control efficacy than liquid formulation of herbicide (fig.4) across all the combination treatments across all the dates in the spring experiment only. Fall start experiment did not show any difference of visual rating between the granular and liquid formulation of herbicides. There was a better weed control when herbicides were applied under mulches in the both experiments (fig.5).

One inch applied mulches either alone or in combination with herbicides in both experiments didn't show consistency in terms of weed control. All the five inch depth mulches either alone or combined with herbicides have shown best weed control over some of the 2.5 inches depth mulches combined with herbicides. But in terms of cost analysis, five inches depth mulch is not recommended as it is very expensive. Two and half inch depth mulch combined with herbicides could give equal weed control as five inches depth mulch. It can be concluded that a combination of two and half inches depth mulch and pre-emergent herbicides is economically viable option to control weeds effectively for longer period of time while saving the environment from herbicide pollution.

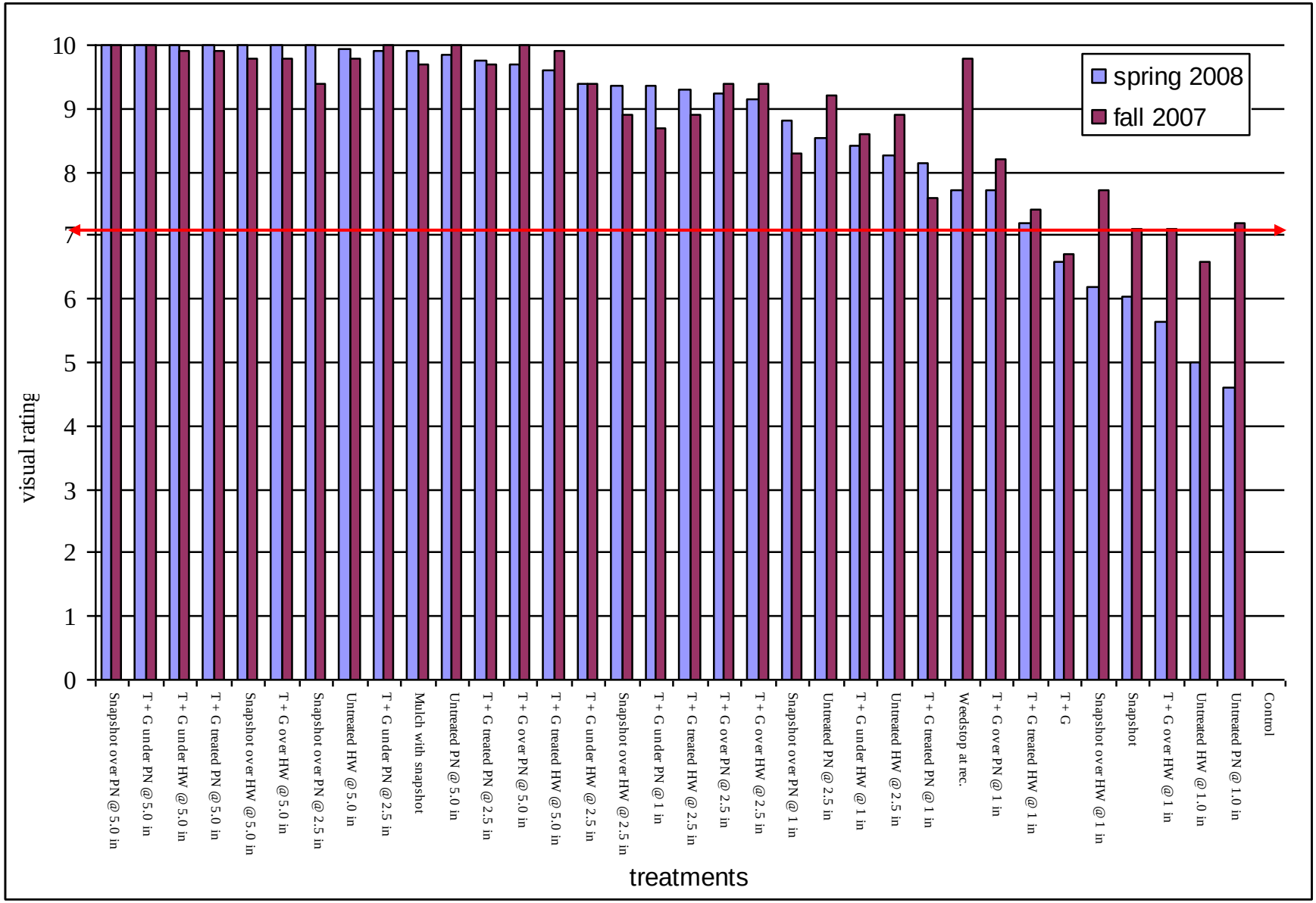

Fig.1.Visual ratings of weed control efficacy for the spring and fall start experiments pooled across all the dates. Visual ratings were given based on a scale of 0-10, 0 for no weed control and 10 for complete control of weeds. The red arrow line indicates the commercially acceptable level.

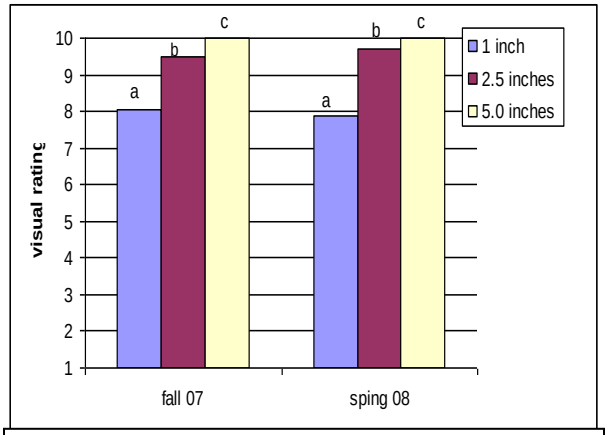

Fig.2: Efficacy visual ratings showing the effect of depth of mulch averaged over all dates. Only mulch + herbicide treatments were used for the analysis. Data pooled across all the dates, mulch, formulation, and application method for each

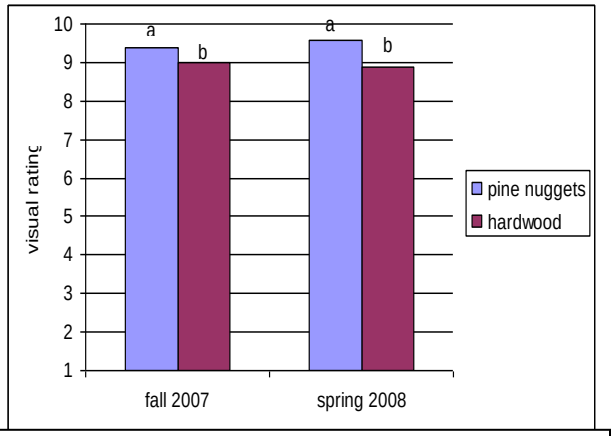

Fig.3: Comparison of pine nuggets and hardwood for weed control efficacy. Only mulch + herbicide treatments were used for the analysis. Data pooled across all the dates, depth, formulation, and application method for each experiment.

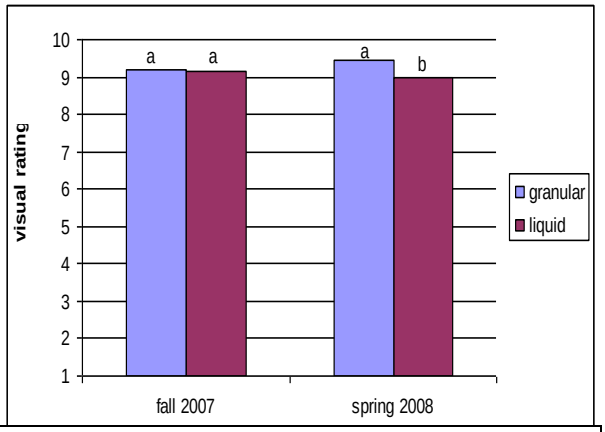

Fig.4: Mulches treated with granular (snapshot), and liquid formulation (treflan+gallery) of herbicides were compared for weed control efficacy. Only mulch + herbicide treatments were used for the analysis.Data pooled across all the dates, depth, mulch, and application method for each experiment.

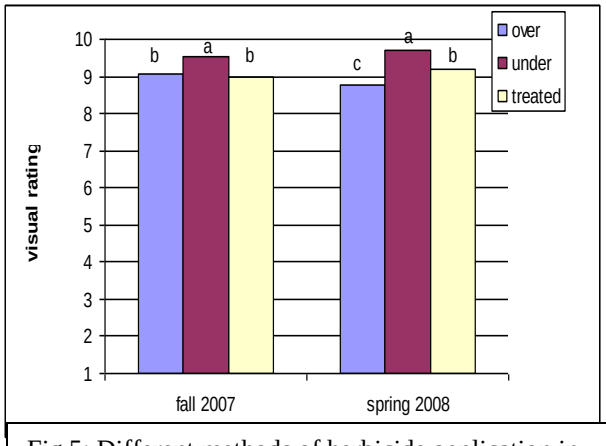

Fig.5: Different methods of herbicide application in association with mulches were compared for weed control efficacy. Only mulch + herbicide treatments were used for the analysis. Data pooled across all the dates, depth, formulation, and mulch for each experiment.

* Bars with different letters for each start date (fall or spring) are significantly different based on $\alpha = 0.05$.

Literature Cited:

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