Chemicals and Invasive Weed Control Methods

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A recent article in ***Wildland Weeds*** featured efforts to control kudzu without chemicals. ***"Pest control without chemicals"*** is a popular topic in many areas, including organic food production and land management. I think I know what people mean when they use this wording, but in actuality, most pest control methods involve some use of chemicals. Both herbicidal and non-herbicidal control of invasive weeds have their place, and people utilizing either method need to fully understand the impact of the method they decide to use. In this article I want to compare some of these methods, and suggest that all methods be carefully compared before choosing one or more.

MECHANICAL METHODS

Mowers, trimmers, and other mechanical equipment all utilize fuels of some type. All fuels have some environmental impact, and all are toxic chemicals. Manual and mechanical clearing operations typically take more work days to complete, and the extra crew travel can also lead to higher use of fuels (chemicals) for travel to and from the site. Projections for controlling kudzu on relatively open level terrain are as follows: A five- person ground herbicide crew can treat 10 to 15 acres per day, at a labor cost of $60 to $100 an acre; a three-person aerial helicopter crew can treat up to 300 acres in a day if the kudzu is in large blocks in a centrally located place, with an application cost of $40 to $60 an acre. Herbicide costs would be an additional $25 to $85 an acre, depending on the site. Data provided by the Kudzu Coalition (www.kokudzu.com) show that a skid steer loader can clear one acre in twelve hours, at a cost of $1,200 per acre, if volunteer labor and equipment is not available. Hand clearing is ten times slower than a skid steer. The necessity for retreatment of regrowth should be factored into costs in all control methods.

Mechanical equipment from chainsaws to bulldozers uses many chemicals, including gasoline, diesel, hydraulic fluids, and lubricating oils. Reading an MSDS for chainsaw bar oil reveals it contains potentially carcinogenic compounds; environmental or toxicological data is usually not provided. The toxicity of gasoline is many times higher than many herbicides recommended for kudzu. More gas will be used per acre to mechanically clear kudzu than will be used to spray with herbicides. Compared to gasoline, diesel is less acutely toxic, more in the range of common herbicides. Potential greenhouse gas impacts are another consideration when using fuel.

A study by the Swedish Board of Occupational Safety and Health[(1)] showed that workers and the environment are exposed to carcinogenic and poisonous gases from an average of 14 liters of fuel per hectare. They found mechanical clearing operations deposited an average of 7 liters/ha of minimally tested fuels and lubricants unburned through the exhaust. They also found that chainsaw bar oil remains in the soil for up to ten years.

While many mechanical methods can remove kudzu with minimal soil disturbance, some can expose and disturb the soil. Using data from agricultural fields as a comparison, plowed fields can erode over 12 tons of soil per acre per year, where reduced tillage fields with 93% vegetative cover lose 0.3 tons per acre per year. The soil loss from high soil disturbance methods and the pollution they cause make them environmentally unacceptable and not sustainable.

PLASTIC SHEETING

Polyethylene sheeting is a weed control method employed to kill kudzu and other weeds, and is often recommended by organic growers for general weed control. Polyethylene is not organic; it is a chemical derived from oil or natural gas, it is not biodegradable, and there is no positive data available on environmental or toxicological effects. Its use will raise soil temperatures by 10 degrees C or more, resulting in potentially negative effects to desirable soil flora and fauna. The MSDS for polyethylene states: "Degrades very slowly and may become a nuisance."

To cover one acre of kudzu or others weeds with 6 mil polyethylene sheeting would take 1,329 pounds of plastic costing more than $2,000 dollars for the material alone. Many kudzu patches can be controlled with five pounds of herbicide active ingredient per acre; weeds can be controlled in mulch beds with less than a pound of herbicide per year. Also, the herbicides' toxicological and environmental effects have been well studied, while much less is known about the environmental impact of polyethylene sheeting. Re-using the plastic and not leaving it on site would reduce its environmental impact.

GRAZING

Another kudzu control method is grazing with goats and sheep. As soon as the animals are removed, take off your shoes and go for a stroll in the grazed area. What's that between your toes, and what is that smell burning your nostrils? Will what you see and smell get into a creek? Is the soil trampled and compacted; has any desirable vegetation been eaten?

WEED BURNERS

Propane weed burners have been tried by workers in specialized areas, and are often recommended widely by the organic community. I think most readers can visualize the many potential hazards and drawbacks from this method. Propane is a chemical not produced by "organic" methods. It contains radioactive elements including radon, lead, polonium, and bismuth. Spot or broadcast burning kudzu or other weeds is often effective in a control program, but burning contributes to pollution and releases many chemicals into the environment that may be either beneficial or harmful.

continued on page 20

A land manager should consider all available options for efficacy in achieving the desired result: worker safety, environmental safety, non-target impacts, and finally, the cost of the method.

WORKER SAFETY

Aside from environmental impacts, another important area to consider is the safety of workers using herbicidal vs. non-herbicidal control methods. A study in Ontario[2] found that manual weed control had an accident rate 24 times that of ground herbicide application, with 60 times more work days lost. Workmen's compensation rates in the US for manual or mechanical brush clearing are many times higher than herbicide applicators, with rate differentials of eight times or more[3]. Many other studies conducted in the US and Canada point to higher injury rates in mechanical and manual brush and weed control.

VOLUNTEER LABOR

Some land managers may control weeds using volunteer labor. Training all volunteers to use herbicides instead of manual methods would not be practical, but core volunteers who have the knowledge and skills could be trained to safely use herbicides in one day. Volunteers using the proper herbicide and backpack sprayers can treat a lot more acres than those using manual methods.

Unless there is an overriding reason to rule out a particular invasive weed control method, it is worth taking the time to consider the total economic and environmental costs of the different treatment methods available, including herbicides. A land manager should carefully weigh efficacy with worker safety, environmental safety, non-target impacts, and finally, the cost of the method. Due to economic and environmental concerns, the amount of fuel needed per acre for each treatment method should be considered. Ruling out herbicides without examining all these issues might be a necessary philosophical or political decision in some cases. Managers must be aware of public opinion and communicate to the public the costs, risks, and benefits of different treatment types.

I hope this discussion has raised some points of interest. When looking at ways to control weeds, be sure to consider all the options.

(1) Taylor, L. "Environmental and Economic Implications of Vegetation Management." A presentation made to the Canadian Pulp and Paper Association Annual Forum, Alberta, Canada, April 6, 1994.

(2) Howard, C. 1992. Field worker injury in vegetation management programs. Can. For. Serv., Sault Ste Marie, Ont., For. Pest Mgmt. Inst. Newsletter 10(1).

(3) State of Missouri Table of Workmen's Compensation Rates.

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