

**APPENDIX 2: SPOT-BURNING USING PROPANE TORCHES**

Adapted from Jack McGowan-Stinski, Land Steward  
The Nature Conservancy, Michigan Chapter

Spot-burning means burning individual plants or groups of plants (or a small area) using a propane torch or similar device. These torches can also be used to ignite brush piles. Two advantages to spot-burning are: 1) the torches can be used in areas where there is little or no fine fuel to carry a prescribed burn; the primary fuel source is propane, and 2) these torches can be used during wet conditions to kill invasives.

**EQUIPMENT SET-UP:**

The torch we use in Michigan is made by Flame Engineering, Inc.(1-800-255-2469), and is the "VT 3-30C Red Dragon Vapor Torch Kit". This torch has a maximum output of 500,000 BTU/hr, with maximum flame temperature of 2,050 - 2,075 °F. Under normal operating pressure about 10 lbs. propane/hr will be used, with maximum consumption at maximum operation of about 23 lbs./hr. Burn time when using a full 20 lb. propane tank is about 2 to 2.5 hours for spot-burning; burn time is 1 hour with 10 lb. tank. This VT 3-30C Red Dragon Vapor Torch has a 3 inch diameter bell (torch tip) and is used for burning large areas; we use a VT 2 ½-2C with a 2 inch diameter bell for more precise burning (burning individual invasive plants next to rarities).

Propane tanks (10 or 20 lb.) are carried on exterior-frame aluminum backpacks (shoulder straps plus waist belt). The packs are modified by attaching a base that the tanks fit into; the base is made out of 1/2 inch angle aluminum, which is bolted to backpack, and the bottom of the tank is bolted to this aluminum base with wingnuts, which provides a stable support and ease in changing tanks. A torch kit includes a 10 foot gas line; we shorten to 5 feet to allow freedom of movement but reduce snagging on brush while torching.

Use a carrying case/safety case for torch and gas line when transporting to site or into preserve. The case is made of a 4.5 foot 4 inch diameter section of PVC (schedule 3 plastic "sewer-and-drain" pipe) with a cap cemented on bottom and a cap (uncemented) on top. Extra o-rings for the torch-to-tank coupling are duct-taped inside top cap. Bags strapped on to case include wrench, flint lighter, soapy water (in saline solution squeeze bottle; to test for gas leaks at connections and supply hose). The case is "strapped" onto backpack so you are "hands-free" when walking into site. Approximate backpack weight of torch, carrying case, and propane tank (using a full 20 lb. tank) is 48 lbs.

**Spot-burning Equipment:*****Communication:***

- Burn prescription copy
- Radios with chest holders, and ear phones
- Checklists, emergency numbers
- Cellular phone
- Weather kit(s)

***Ignition:***

- Propane tanks, 10 and 20 lb.
- modified exterior-frame aluminum backpacks, straps and/or bunji cords
- Propane torches in PVC carrying cases, each with soap mix, wrench, flint lighter, extra o-rings

***PPE:***

- Nomex firesuits
- Leather gloves
- Leather boots, 8 inches high, Vibram sole, leather laces
- Hard hats with Nomex ear/neck protectors, face shields, chin straps
- First aid kit
- Water cooler with 1 liter water bottles, minimum 2 per crew member
- Belt and pouches to carry water bottles

***Water-related and Holding:***

- Backpack pumps
- Replacement parts for backpack pumps
- “Slip-on” pump unit includes: 110 gallon water tank cabled onto wooden cradle and bolted to truck frame, Honda water pump, manifold valving system with pressure gauge and recirculation hose, garden hose with combination adjustable nozzle and short section 1 ½ inch hose with combination adjustable nozzle, laminated directions for “Opening/Closing” valves
- Portable water pumps (Honda)
- 1 gal fuel can w/premium unleaded, 10W30 oil, drafting bottle for pumps
- Garden hose
- Intake or suction hose with foot valves
- Combination Nozzles
- Grass/thatch Rakes

**Some safety tips:**

- Crew is outfitted in fire safety gear (nomex, hard hat with face shield and nomex ear/neck protector, leather gloves, leather boots).
- When attaching tank to backpack make sure pressure relief valve on top is pointing AWAY from person carrying pack. This valve is designed to release pressure/vent gas if tank heats up too much, and this vented gas can ignite, forming a "torch" of its own. I suggest that anybody using these torches “talk safety” with a local propane dealer.
- The torch tip will heat up very quickly, and retain heat, so always be cautious where you set torch down; I recommend cooling down with water where possible.
- These torches produce lots of noise. For spot-burning we wear ear plugs; for prescribed burning the igniter uses an ear phone attached to fire radio, PLUS the igniter should always keep an eye out for visual signs.
- These torches should only be used by somebody who has both some fire training AND common sense, or you will end up with injuries, damage rarities, and/or start a

wildfire (and if you do not believe these torches produce a lot of heat, try melting a golf ball – it does not take long!).

- Do not turn your back and backpack towards open flame (remember that you are carrying an explosive on your back...), and do not set tank down near fire or in recently burned area.

### **Removal Method for Seedling Buckthorn (*Rhamnus* spp.)**

Once adult buckthorn have been removed from an area it is likely that large numbers of seedlings will germinate in the area during the next growing season. There also will likely be saplings that were not herbicided, and/or some resprouts from cut-stumps that missed treatment.

Hand-pulling of seedlings is labor- and time-intensive and not always effective. For example, on one work day in June 1996 it took eight volunteers two hours to remove the 125,000+ seedlings from an area approximately 5m x 10m, and this area was soon revegetated with *Rhamnus* seedlings from the disturbed seed bank and missed seedlings.

A more efficient and effective method to kill buckthorn seedlings is to burn them in the first growing season after (non-growing season) removal.

Before work day: Obtain a burn permit from local fire department. Recruit burn crew. Other law enforcement and neighbor notifications occur as necessary. Equipment is checked, propane tanks filled.

During work day: Weather is taken on-site before and during operation. Area to be cleared is defined and checked for fire hazards (wildfire potential, poison sumac/ivy). In fen areas a portable water pump with hose is usually positioned at a seep near work area and used to wetline if necessary, or more frequently used during mop-up. In uplands a slip-on pumper is used. Water backpacks are also used as needed.

A work crew consists of some individuals operating torches (torchers) while others (spotters) monitor progress, wildfire potential, and safety hazards. The crew rotates duties frequently. In large dense seedling patches torchers position themselves in a parallel line and walk slowly while burning in an overlapping pattern; usually only one spotter is needed with this procedure. It is also easier to be non-selective and burn everything except rarities, and let area seed in naturally, or plant with native seed. In areas with scattered buckthorn seedling patches the crew works in teams of torcher and spotter (usually with water backpack.). A “heat shield” (section of metal ductwork) can be used to separate target from non-target species if needed.

The maximum flame temperature occurs 6 to 12 inches from torch bell tip. It will take some practice to learn the most efficient distance to hold torch tip from target. It is also more efficient to use torch with wind direction to reduce torch blow-out or flame blowing back toward igniters. Torching seedlings until wilting occurs is usually sufficient to kill; it is not usually necessary to torch seedlings to ash (although this is more satisfying). If

possible it is more efficient to torch seedlings and saplings at stem base rather than the entire plant.

Mop-up an area completely after torching. Allow torches to cool down (or cool with water) before disconnecting from propane tanks and putting them back into PVC safety cases. Follow disconnecting, storage, and maintenance suggestions in Red Dragon Torches Operating Instructions and Parts Manual.

Usually one treatment removes most seedlings/saplings, but repeat treatment in same growing season or next growing season may be necessary due to seed bank input, or some sapling re-sprouts. Seedlings usually are not capable of resprouting if torched in first growing season (before August), although I have had good success in removal when spot-burning in September. Repeat treatments are usually on an individual or small patch basis.

**Date Authored:** April 2001