

The Use of Flaming to Control Wildland Weeds: Equipment, Technique, and Safety Information

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THE EQUIPMENT

There are two types of flaming equipment, based on the way fuel is delivered to the torch.

In **Vapor withdrawal systems**, the fuel, liquid propane gas (LPG), is converted to a gas in the tank, and travels through the hose to the torch as a gas. When using the larger size vapor torches, the expansion of the liquid fuel to gas causes the tank and the torch handle to get very cold. Gloves are recommended. In wet and cold weather, the tank will ice up, and the valve on the torch may not operate. If this happens, shut off the gas with the main valve on the tank. The tendency of vapor systems to frost up makes them most suitable for intermittent use. Icing can be reduced by using a smaller size torch, or by using a larger cylinder. (Fuel tanks are called cylinders.) Of course, larger cylinders are heavier and harder to handle. I use aluminum cylinders. They are expensive, but much lighter. A good source is Go2marine.com.

In **Liquid withdrawal systems** the fuel is delivered as a liquid all the way to the tip of the torch, and is vaporized there. Liquid systems do not ice up quickly, and so are better suited for continuous use. Both the cylinder and the torch are made specifically for liquid withdrawal. (You cannot use a liquid cylinder with a vapor torch, or a vapor cylinder with a liquid torch.) If you are flaming large areas on fairly level ground, a liquid system with a 40 lb cylinder mounted on a hand dolly is a good choice. Larger cylinders are available and can be mounted on trailers, tractors, or ATV's.

Small torches with capacities of 50,000 to 100,000 BTU are suitable for spot flaming or small jobs. They are usually used with a 10 or 20 lb cylinder which can be carried in one hand. A set-up is available from Flame Engineering www.flameengineering.com which uses a 10 lb cylinder on a backpack frame that is handy, especially in hilly terrain. This company has a free catalog with a full range of flaming equipment. Hand held torches up to about 1,000,000 BTU can be used for wildland flaming. Larger torches will allow you to work faster, but are more difficult to control around non-target species. In addition, they use much more fuel. A 100,000 BTU torch uses 2 to 5 lbs/hr, whereas a 750,000 BTU torch can use up to about 30 lbs/hr.

My current favorite torch is a PowerJet, made by Manchester Tank www.mantank.com/products/hand_torch.htm. It is a 750,000 BTU vapor torch, very light in weight, and is trigger-activated with a standing pilot light. A vapor torch this size will frost up a 20 lb cylinder in minutes, so I use quick connectors which allows me to change tanks quickly and keep working.

THE TECHNIQUE

First, and most important, READ THE SAFETY PROCEDURES GIVEN HERE AND WITH THE EQUIPMENT BEFORE PROCEEDING. This equipment is soundly built with user safety in mind, but careless or improper use can result in serious injury.

To avoid the risk of fire, flame only when the site is too wet to carry fire or when you have employed appropriate prescribed burn procedures for containing any fire which may start. I prefer flaming while it is actually raining. It will keep you warm, allowing you to work in otherwise unpleasant conditions. In addition to being safer, flaming when the ground is wet transmits heat deeper into the soil, helping to kill roots.

Follow correct procedures for assembly and use of all components. Check all connections for leaks before proceeding. To light, make sure the valve on the torch handle is closed, then SLOWLY open the valve on the tank. (If you open it too fast, the safety shut-off system will activate, preventing fuel from leaving the tank.)

Point the torch in the air, and slowly open the valve on the torch handle just enough to hear a little gas being released. Then light the torch from the back of the bell. I use a trigger activated butane lighter. Open the valve further until the flame has little or no trace of yellow. This is the optimum temperature.

Hold the torch 6" to 12" from the plant. This is where the flame is hottest. Torches vary in their output, and you will quickly learn the most efficient distance to keep the torch tip from the target. Keep the torch moving. The object is to use just enough heat to produce wilting. If you burn the plant, you are wasting time and fuel, and may actually get less kill! A leaf pressed between the fingers will show a fingerprint when flamed properly.

Flaming is most effective from the time that plants are at the dicotyledon stage up to when they have produced about 5 or 6 true leaves. When flaming taller plants, concentrate heat on the lower portion of the stem. If the torch blows out frequently, you may be holding it too close to the ground. If it's windy, it helps to keep the torch pointed downwind. Do not flame under trees or shrubs with low overhanging branches, especially conifers!

The torch tip gets very hot, so be careful where you set it down. When you are finished flaming, hold the lit torch in the air and shut off the gas first at the valve on the tank, letting all the gas in the hose burn off. Then shut off the valve on the torch, and disconnect the hose from the tank. Do not vent unburned fuel into the air. Never transport the equipment without first disconnecting the hose from the tank, and do not transport an LPG cylinder in a closed vehicle.

Checklist For Safe LP Gas Use (From Flame Engineering)

1. DO NOT use torches on or near combustible materials.
2. Inspect equipment daily.
3. Secure cylinders in a level, upright position. DO NOT invert or lay cylinders on their sides.
4. Use only vapor equipment on cylinders equipped with vapor withdrawal valves. Use only liquid equipment on cylinders designed for liquid withdrawal. DO NOT invert vapor cylinders to dispense liquid.
5. DO NOT apply flame to cylinders to increase pressure.
6. DO NOT operate torches or any equipment if the odor of LP Gas (butane/propane) is evident. Immediately shut off all valves and, using soapy water, check all equipment for leaks.
7. LP Gas (butane/propane) is heavier than air which causes it to accumulate in low areas. Check low areas for accumulation and ventilate. Be certain all work areas are well ventilated.
8. Keep torches, open flame, and sources of ignition away from cylinders, regulators, and hose.
9. Cylinder valves must be protected. DO NOT hoist cylinder by the valve.
10. Gloves should be used at all times. Long sleeves, long pants, and boots are recommended.
11. Never leave a lighted torch unattended.
12. For more detailed information, consult your local LP dealer, Flame Engineering, NPGA, NRCA, or NFPA Pamphlet 58. This information is provided as a general guide for safe LP-Gas use and in no way constitutes a complete safety program.

Daily Equipment Checklist

1. Be sure you have a fire extinguisher (type ABC) on the job, easily accessible to each worker.
2. Check LP cylinders for dents, damage to collar, damage to valve or corroded foot ring. Never hoist a cylinder by the valve. Secure cylinders in an upright position. Know whether you are using LIQUID or VAPOR WITHDRAWAL.
3. Visually inspect all parts for damage and wear.
4. Using soapy water, check all connections and fittings for leaks. DO NOT use a match or open flame.
5. Ignite torch. Check operation of valve and other adjustable parts.

SAFETY NOTES:

- When extinguishing a torch, shut off cylinder valve and allow gas to burn out of lines.
- Be certain to comply with all safety guidelines and local ordinances regarding the use of an open flame.
- Please contact Flame Engineering, your local LP-Gas dealer or fire officials if you have questions regarding proper operating procedures and safety guidelines.

CAUTION:

- Propane is heavier than air which causes it to accumulate in low areas. Be certain all areas are well ventilated.
- Propane has a distinct odor. If you smell it, immediately discontinue work, extinguish all flames, find the leak and correct it.

WARNING:

Use extreme caution at all times. You are using an intense open flame. Disregard of safe practices can result in severe fire damage, serious personal injury or death.