

# BUILDING A RESEARCH FLAMER

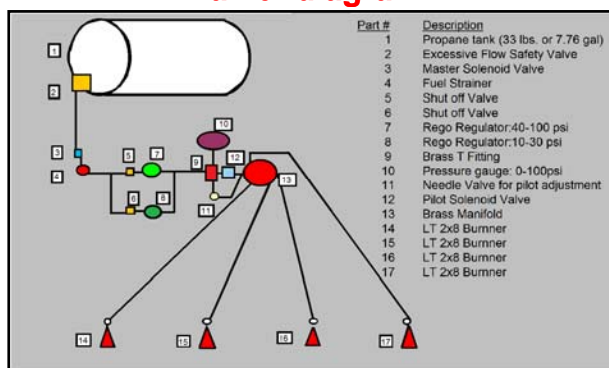
## Introduction

Weed flaming can be an additional tool for weed control in organic cropping systems. There are several commercial flammers available for use in agronomic crops with the cost ranging from \$6,000 to \$15,000 depending on the number of rows the flamer covers. However, most of the commercial flammers are physically too large to be effectively utilized in small research plots.

## Objective

To build a relatively inexpensive research-type flamer for flaming weed and crop species at various growth stages.

## Flamer diagram



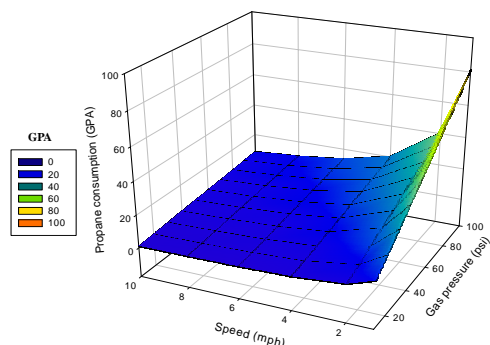
Thumbprint 3 min after flaming Morning-glory 14 DAT



Field corn 3 DAT

Field corn 14 DAT

## Flamer calibration



Pressure (PSI)	Speed (mph)					
	1	2	4	6	10	
10	10.24	5.12	2.56	1.71	1.28	1.02
20	18.16	9.08	4.54	3.03	2.27	1.82
30	26.08	13.04	6.52	4.35	3.26	2.61
40	34.00	17.00	8.50	5.67	4.25	3.40
50	41.92	20.96	10.48	6.99	5.24	4.19
60	49.84	24.92	12.46	8.31	6.23	4.98
70	57.76	28.88	14.44	9.63	7.22	5.78
80	65.68	32.84	16.42	10.95	8.21	6.57
90	73.60	36.80	18.40	12.27	9.20	7.36

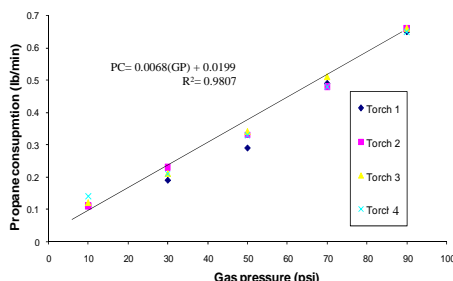


Figure 2. Propane consumption (PC) as a function of pressure (GP) using LT 2x8 burners.



Broadcast flamer covering 1.2 m (4ft).



Intra-row flamer covering 4 rows (2.5ft apart).



Broadcast flamer covering 3.0 m (10ft).

Figure 1. Propane consumption (GPA) as a function of pressure and speed with LT 2x8 burners set 12" (30.5 cm) apart.

## Results and Discussion

- Three types of flammers were built, including two types for broadcast flaming (1.2 m and 3 m wide) and one for intra-row flaming that can cover three to five crop rows planted 76cm apart. Custom designed main frame was built to be interchangeably used with each flamer type, while a three-point-hitch allowed mounting on a tractor or ATV.
- Square steel tubing of different sizes (2.5-5.6cm) was utilized for building the main frame, which allowed to easily adjust burner height, burner angle, distance between burners to fit the crop row width, and the flame direction (inter or intra-row).
- Low and high pressure regulators (parts 7 and 8 of flamer diagram) control propane pressures ranging from 70 to 620 kPa (10-90 PSI).

- Propane application rate ( $\text{kg ha}^{-1}$ ) was regulated by a combination of propane pressure and application speed (Figure 1). For example, using a driving speed of about 6.44 km/hour (4MPH), the propane rates can vary from 12 to 87  $\text{kg ha}^{-1}$  (2.6-18.4 GPA).
- Burners were purchased at the cost of about \$100 per burner, while the overall cost of material (eg. steel tubing, propane tank, valves, electronic safety solenoids, two pressure regulators, hose) ranged from \$2,000-\$3,000 depending on the flamer (labor cost not included).

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