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January 1972

Engineering Report 7105

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A Field Weed Burner

Engineering Research Service,
Research Branch,
Canada Agriculture,
Ottawa.

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FIELD WEED BURNER

PROJECT REPORT 7105

A field weed burner to reduce viability of weed and cereal seeds in dormant oat selection plots was requested by Ottawa Research Station in 1970. A custom made burner was ordered from Rexotherm of Canada Ltd., 44 Six Point Road, Toronto 18, Ontario. Specifications were as follows:

- 8 liquid propane burners 400,000 B.T.U. each
- 1 vapour propane pilot burner
- 1 regulator 55 psi maximum for liquid propane
- 1 regulator vapour propane for pilot
- 2 quick shut-off valves for liquid propane
- 1 shut-off valve for vapour propane
- 2 20 ft. 3/8" stainless steel braid reinforced hoses for liquid propane
- 1 15 ft. 1/4" hose for vapour propane
- 1 Combustion Float - 6 ft. wide x 4 ft. long mounted on steel wheels with tongue for towing. Lined with 2" refractory material, 8 burners equispaced on an adjustable angle manifold mounted on front of combustion float to aim flame into combustion area, steel curtains on 2 sides and back, adjustment for height of float above ground.

The equipment constructed to meet specifications to obtain an Ontario Department of Energy & Resources Management approval label.

The following items were shop made to compliment the combustion float:

- 1 tank carrier for 3 - 100 lb. propane tanks, 3 point hitch mounted with drawbar attachment for towing combustion float. Carrier divided into 3 sections to isolate tanks and to hold tanks upright.
- 1 side mount hitch to tow float to one side of tractor.
- 1 30 ft. tongue to draw float far enough behind the tractor to allow the tractor to be operated safely when the burners were pointed forward.

Contribution No. 289 from Engineering Research Service.

The following information was given by Rexotherm Ltd.:

Total B.T.U./hr	- up to 4,000,000
Gas consumption at 30 psi	- 1,588 cu. ft. or 187 lbs/hr
Coverage at 2 m.p.h.	- 1.46 acres/hr
Cost	- \$13.10 per acre

Under field tests actual fuel consumption at 55 psi (higher than recommended by Rexotherm but within safety limits of equipment) was 328.5 lb per hour for a cost of about \$22.90 per acre.

Temperature Measurement

Equipment was not available to measure air temperature inside of the combustion float.

Ground temperature was measured with thermocouples spaced at intervals of 1 cm at and below ground level to 4 cm. Thermocouples were scanned with a Solatron Data Acquisition System both individually for the upper thermocouples and for all five thermocouples. Tests were made at speeds of 1 and 2 m.p.h. Little change was noted in thermocouples at 3 and 4 cm depth. The thermocouple at 2 cm depth indicated a 2.0°C rise at each pass of the burner at either speed. At 1 cm depth a maximum temperature rise of 6°C was indicated. The surface thermocouple indicated a rise to 780°C at 1 m.p.h. and to 579°C at 2 m.p.h.

Field Tests

A selection plot for dormant oats, uncultivated for two years, was strip treated at 1 m.p.h. in April 1971 to observe results. Emerging weeds were destroyed. Established weeds, mostly dandelions, were wilted but not killed. Noticeable affect was apparent for up to 3 weeks after treatment, but after that period, total weed cover resulted, indicating that dormant weed seeds were not affected. An interesting side effect was growth of barnyard grass on the burned sections earlier than the normal emergence date. From observation, the burner was judged ineffective in reducing weeds by sterilizing seeds by heat on spring application except at very slow rates of travel ($\frac{1}{4}$ m.p.h.).

In a second field test, where a growing oat crop was strip treated at several different speeds, visual indications were that flame treatment at $\frac{1}{2}$ m.p.h. would destroy emerging weeds when the growing crop was in the two leaf stage.

Field tests were by observation only. Pressure setting at the liquid regulator was 55 psi at all times.

Other Uses

The field burner was loaned to National Capital Commission, Ottawa, for a trial on artificial ice to melt the surface of the ice for smoothing of skating surfaces. Favourable results of this trial have resulted in a burner being built for improvement of the ice surface on the Rideau Canal and Dows Lake in Ottawa as a skating promenade.

Other uses for this type of equipment include wilting of forage before cutting, burning of potato or root crop haulm prior to harvesting, burning of crop residue to destroy insects and disease, burning of blueberry plants in rotation, and burning grass seed fields as a replacement for open field burning. Application of a high heat source apparently results in cleaner burning of crop residues to reduce air pollution*.

Other Equipment

The equipment listed below is of a similar nature.

1. Blaak Burner - manufactured by N.V. Machine bouw de Blaak Blaak sedyk, Oost 27, Heinenoord, Netherlands.
An oil burning machine with a 6.9 m burning width developed specifically for burning potato haulm.
2. A field weed burner has been developed by Mr. William Yaremicio, Vegreville, Alberta, for similar use to the E.R.S. model but uses oil burners. Patent application is underway.

G. B. Hergert

*Implement & Tractor 86 (12): 39. May 7, 1971.

