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## **MOBILE AERATED-STEAM SOIL PASTEURIZER UNIT**

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The need for removal of pathogenic organisms in soil mixes to be used for seed germination and other propagation and growing purposes is well known and accepted (1,3,5,6,7). The

two general methods for doing this are: (1) by chemical treatment and (2) by heat treatment. Heat, particularly steam heat, is acknowledged to be superior to chemicals for several reasons (5). In heat pasteurization, holding the soil mix at the proper temperature for the proper length of time is crucial in obtaining the desired results. It is also important that the soil mix be moist for several days prior to the time of heat treatment to obtain satisfactory killing of pathogens and weed seeds. The ideal temperature combination is generally accepted as 140°F (60°C) for 30 minutes (5,8). Temperatures lower than this will not kill the pathogens and weed seeds. Temperatures much higher will kill non-pathogenic beneficial saprophytic microorganisms, thus creating a biological vacuum. If accidental reinoculation with pathogenic microorganisms takes place an explosive increase in their numbers is likely to occur due to the lack of any competing microflora.

In addition, steaming soils at high temperatures, e.g. 212°F can cause the release of water soluble manganese from soil colloids which is toxic to plants. Ammonium toxicity can also develop in soils heated to 212°F.

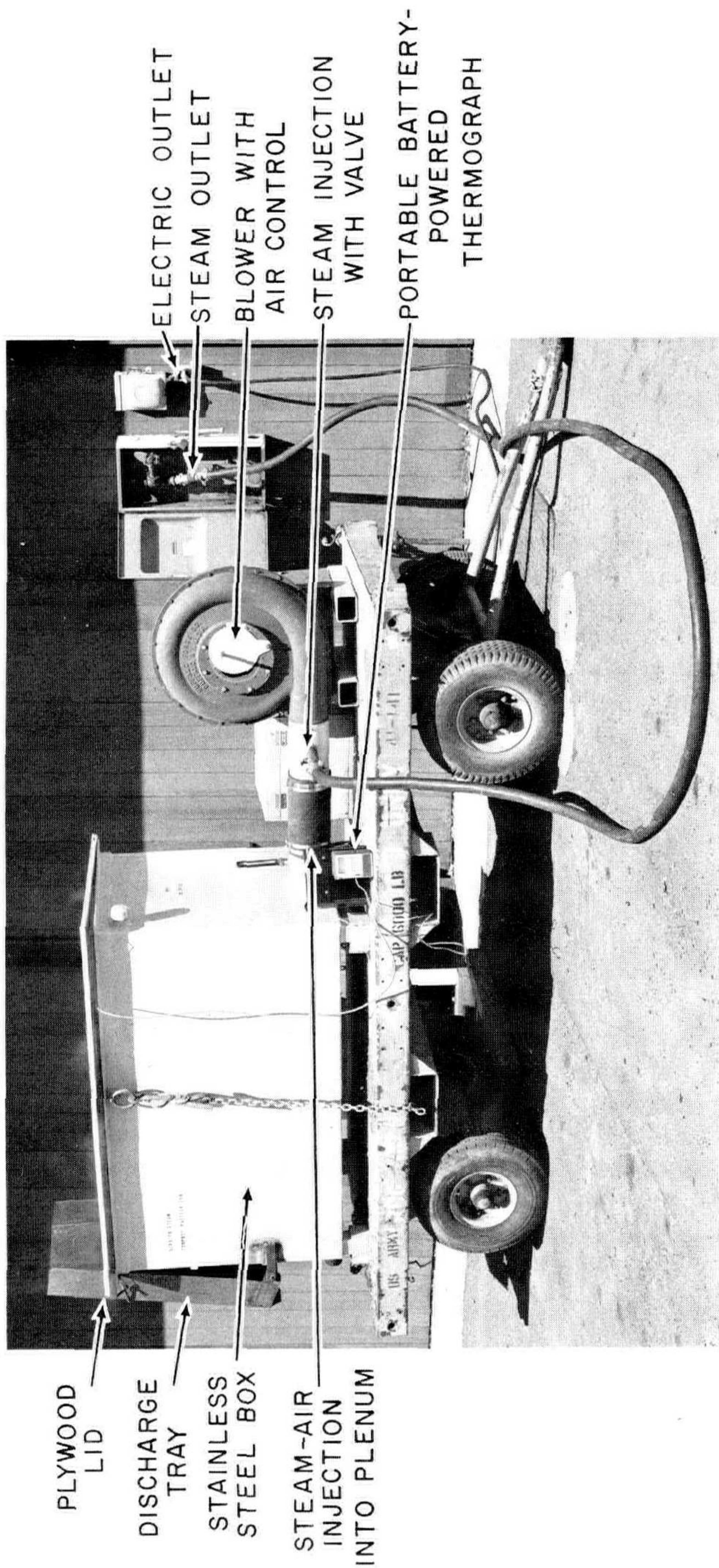
Other advantages in the use of steam-air mixtures for pasteurizing soil mixes, as compared to steam alone are:

- (1) reduced fuel costs resulting from the lower temperatures required,
- (2) quicker cooling of the soil mix which can be accomplished by continuing the air flow after the steam is turned off.
- (3) less possibility of injury to the operators from steam burning.
- (4) ability to heat-treat plastic pots which will withstand 140°F, whereas they would be deformed at 212°F.

Another valuable use for equipment designed to produce 140°F moist heat is in seed treatments for disease control (2,4,9).

The unit we constructed is shown in Figure 1. It is portable, being mounted on a small trailer. Basically, the unit is a stainless steel box 2½ feet wide, 5 feet long, and 3 feet deep with a capacity of ½ ton of mix. Eight inches from the bottom a perforated steel plate (with 5/32" holes on ¼" centers) is supported in place giving a surface, as shown in Figure 2, to hold the soil mix. The cover of the box is 1½" marine plywood board, hinged in place, which will lift to allow excess steam and air to escape. The unit is loaded from the top by removing the covering board.

At the rear of the unit is a metal door and a metal chute for unloading, as shown in Figure 3.



PLYWOOD  
LID

DISCHARGE  
TRAY

STAINLESS  
STEEL BOX

STEAM-AIR  
INJECTION  
INTO PLENUM

ELECTRIC OUTLET

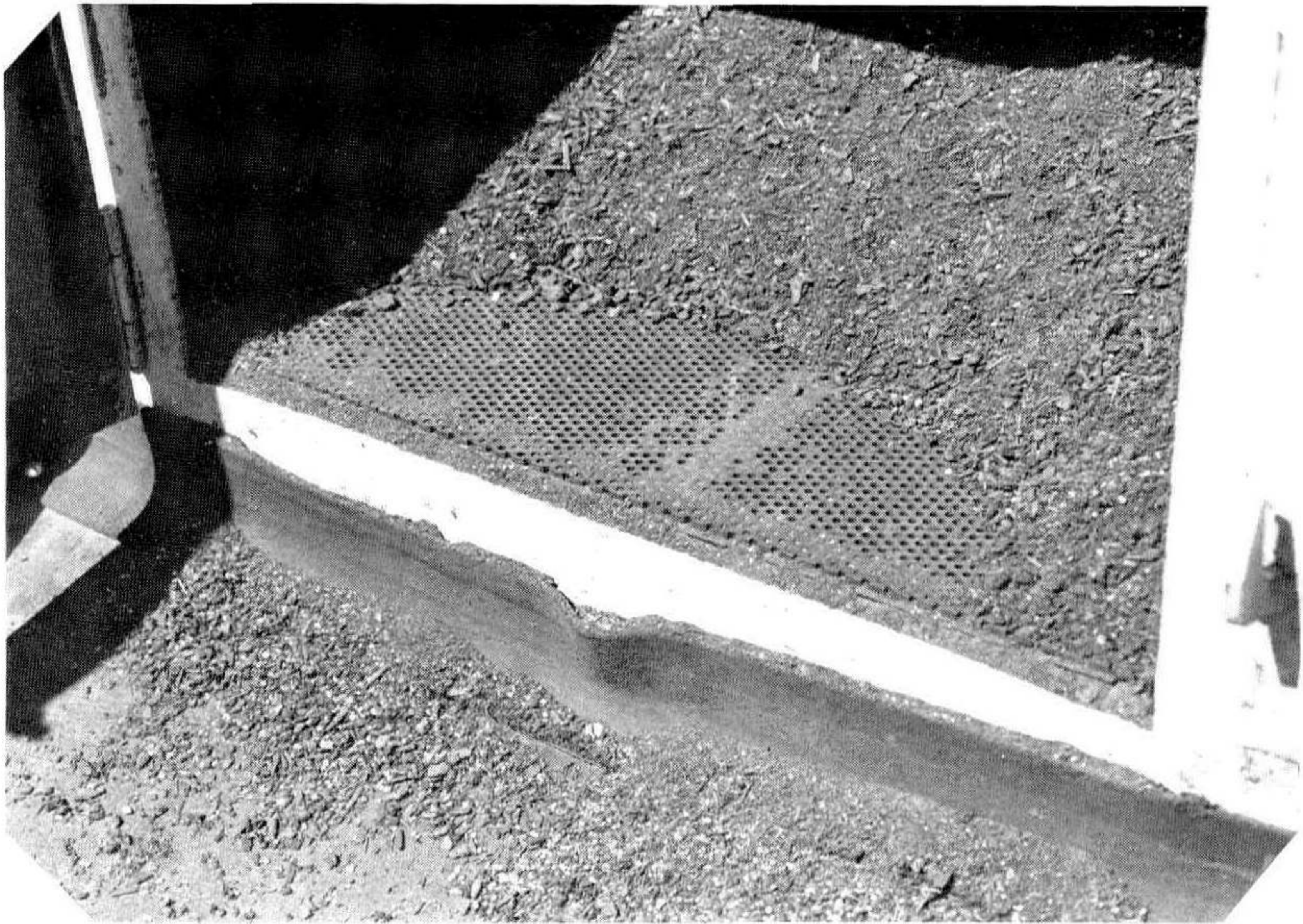
STEAM OUTLET

BLOWER WITH  
AIR CONTROL

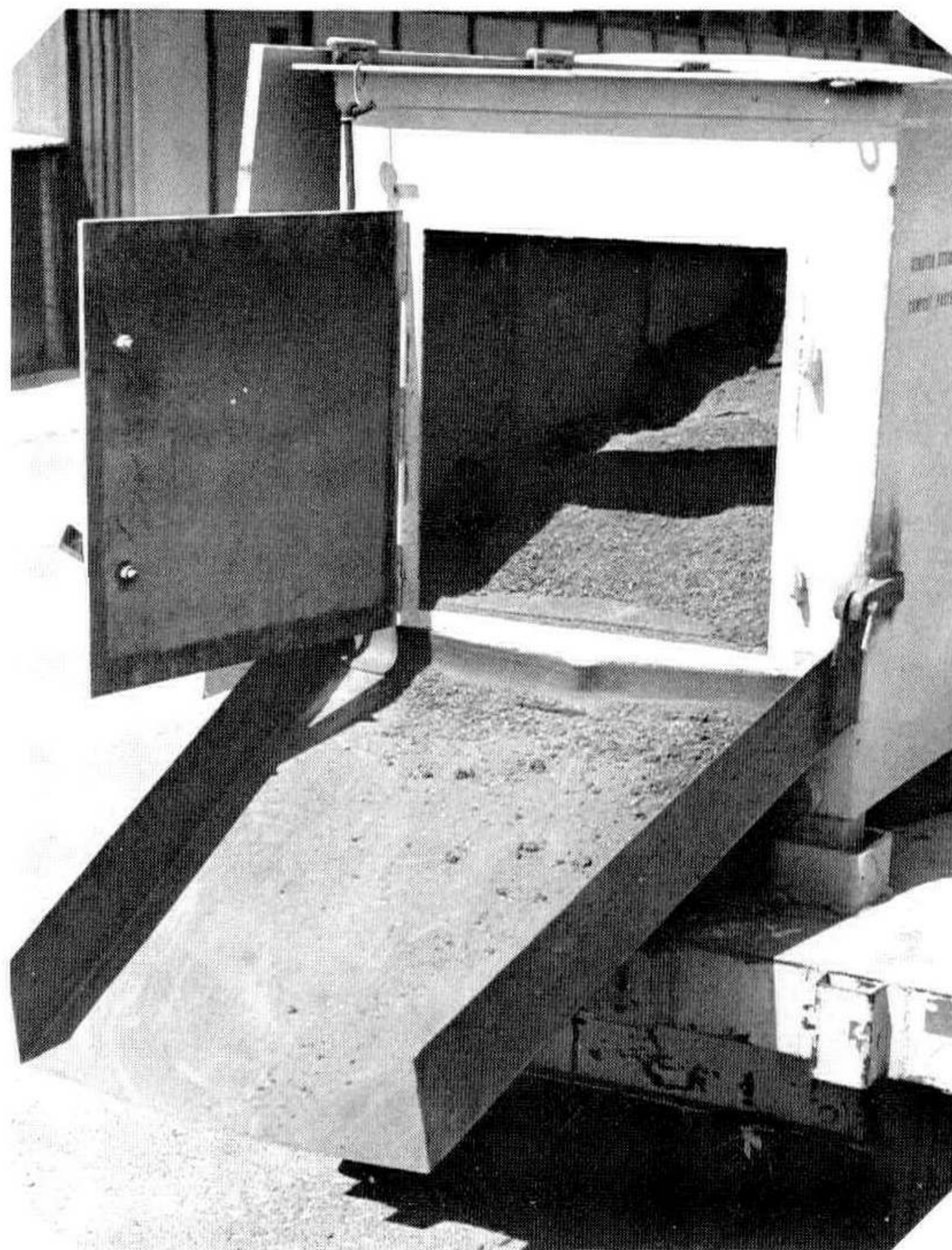
STEAM INJECTION  
WITH VALVE

PORTABLE BATTERY-  
POWERED  
THERMOGRAPH

Figure 1. Mobile aerated-steam soil pasteurizer unit.



**Figure 2.** Interior of pasteurization chamber showing perforated plate over top of plenum chamber where steam-air mixture is introduced.

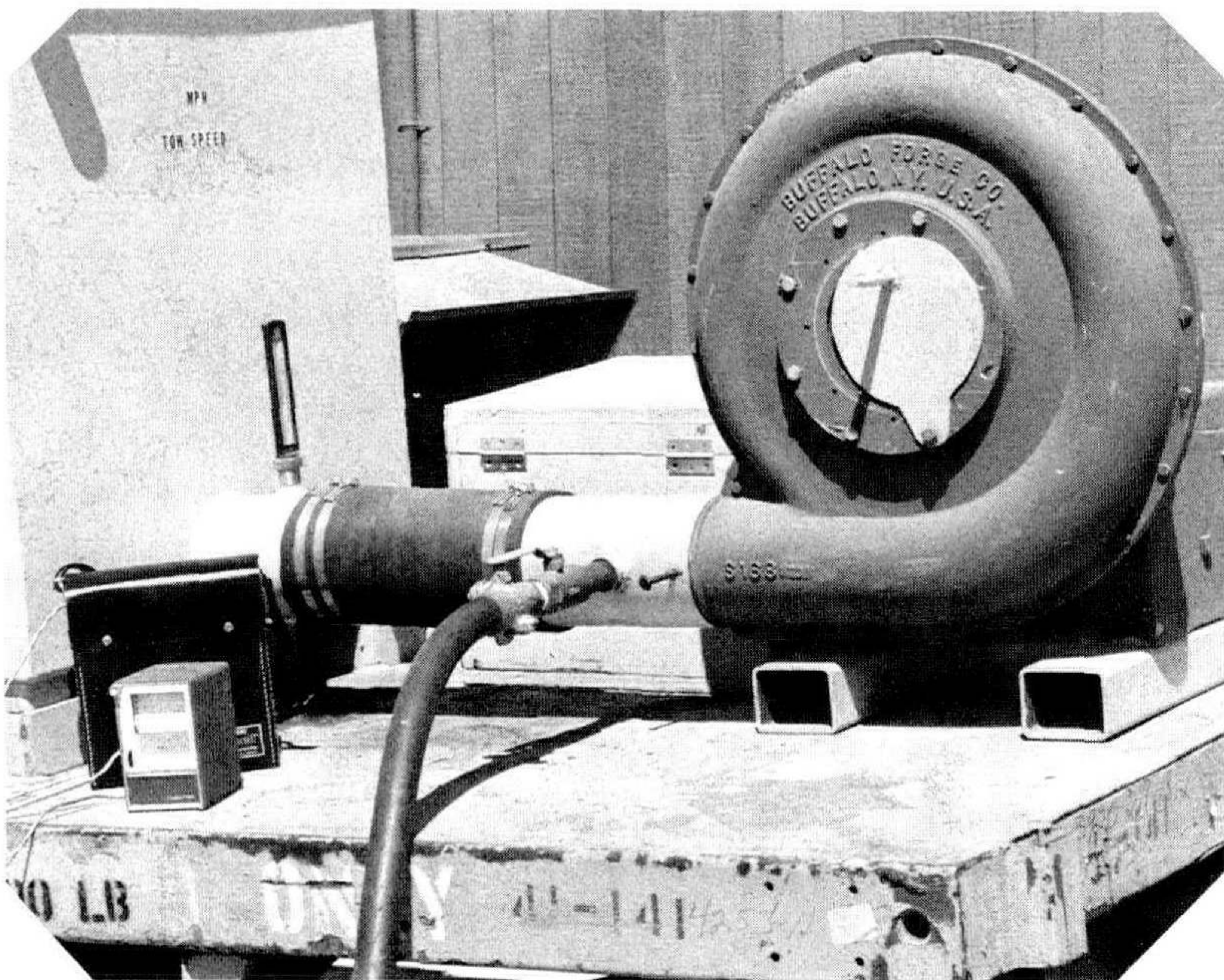


**Figure 3.** Rear of pasteurization chamber showing discharge door and chute for removing soil mix following heat treatment.

Air is introduced into the plenum chamber below the soil by a centrifugal blower operated by a direct drive 3 horsepower electric motor. The blower can deliver a maximum of 2,000 cubic feet of air per minute. It has an 18" diameter wheel, 4" wide with straight blades. An adjustment in the air intake controls the volume of air. In operation, the blower forces the steam-air mixture through the soil mix at 56 cubic feet per minute.

When in operation an air filter should be used to cover the air inlet to avoid introducing dust particles (which may contain harmful microorganisms) during the post-pasteurization cooling down period.

Steam is injected into the air stream as shown in Figure 4 and is controlled by a hand operated valve.



**Figure 4.** Close-up showing steam injection line into blower air stream together with steam controller valve. Also shown is the battery-powered portable recording thermograph.

The temperature curve obtained after the unit is started is followed by observing the chart (Figure 5) of the recording thermograph<sup>1</sup> (Figure 4) which has a bulb inserted into the soil mix. The unit is operated for 30 minutes after the thermograph

<sup>1</sup> Rustrack miniature strip chart temperature recorder, No. 2155A (0°F to 250°F) with thermocouple probe type J-1551. From Western Electro-Mechanical Co. 300 Broadway, Oakland, California 94607.

reaches 140°F, at which time the steam is turned off, but the blower is continued until the soil mass has cooled to ambient temperatures.

A special steam outlet point from a greenhouse steam supply, together with an electric outlet point, were installed for use in operating the unit (Figure 1).

This soil pasteurizing unit has been in operation for about six months with completely satisfactory results.

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### NEW FUNGICIDE EVALUATED FOR CONTROL OF ROOT ROT FUNGI

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**Abstract:** A new fungicide, Subdue (CGA 48988)<sup>1</sup>, has shown a high level of activity in controlling Phycomycetous root rotting fungi that attack ornamental plants. *Juniperus sabina* 'Tamariscifolia,' *Pinus radiata* and *Brassaia*

<sup>1</sup> Manufactured by CIBA-GEIGY Company.