Plans and Instructions for Building a Tapered Boom Type Field Crop Duster

by

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The dusting equipment described in this circular was planned primarily for dusting peas and vetch for weevil. The aphid dusting machine similar to that described in Oregon Agricultural Experiment Station Circular of Information No. 215 is still believed by the authors to be superior for aphid control to the plain boom type, but because of its greatly increased cost and necessarily more restricted size it is being laid aside in favor of the tapered boom duster described herein. A third type of pea weevil duster is commonly called the hood type duster. This duster has proven satisfactory for weevil control, but the tapered boom type is generally considered simpler and lighter and generally easier to build and operate. This entire unit can be mounted on a light truck or pick-up for field operation. The truck or pick-up must have a low gear that is low enough to operate over crop lands at 4 to 5 miles per hour.

For information on kinds of dust, time and rate of application and other control recommendations, growers are referred to Oregon Experiment Station Circular 126, "Pea Weevil Control in Oregon," and Station Bulletin No. 339, "Pea Aphid Control in Oregon."

The Tapered Boom Duster

The drawing and the pictures shown herein give all construction details. The booms are each 18 feet long and start with a 4 inch flexible discharge pipe from the duster blower. The distribution tee gives ample room for dividing the air flow into two streams for the two booms. There are various ways of dividing the air stream from the blower but this distribution tee is easy to build and has ample size to prevent excessive pressure loss. The outlets from the tee are 4" in diameter. A special 4 inch irrigation type quick coupler is welded on the boom to make the connection to the distribution tee. The tee and its supports are constructed so as to support the inner end of the boom. They can be raised or lowered to any desired boom height for various heights of crop.

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Construction Details of Boom Type Duster

Operator demonstrates light weight of boom. Bicycle wheel supports outer end of boom. Trailing canvas is used to help settle dust on plants.

Fig. 1. Showing operator about to attach left boom using rubber gasket quick coupler.

Fig. 2. Showing flexible tubing from blower, distribution tee and both booms attached.

Fig. 3. Operator demonstrates light weight of boom. Bicycle wheel supports outer end of boom. Trailing canvas is used to help settle dust on plants.

Fig. 4. The duster in operation with canvas removed to show uniform distribution of dust along boom.
The 18 foot booms shown in the drawings and pictures were each made of two 6 foot sections of 3\(\frac{3}{4}\) inch and 3 inch 16 gage steel tubing and one 6 foot section of 2\(\frac{3}{4}\) inch boiler tubing. This makes a lighter boom than to use boiler tubing for the full length and its strength is adequate. Since it would be very difficult and much more expensive to make up an 18 foot boom with a uniform taper through its entire length, a very satisfactory boom can be made by using the 6 foot sections. It is very important to have a taper at each change of size of pipe rather than to slip the smaller pipe inside the larger pipe and weld. This latter method is very unsatisfactory and will cause ununiform dust distribution from the bottom holes. A taper can be made by splitting the smaller pipe back 4 inches from the end by use of a cutting torch.

It will require about eight cuts of this type. Each of the eight sections thus formed can be spread so that the smaller pipe can be slipped over the larger pipe and welded. The openings formed by spreading the smaller pipe can be filled in with welding rod. This will make both a smooth taper and a strong weld.

These booms can be quickly disconnected from the distribution tee and mounted on racks along the side of the pick-up for transportation from one field to another.

The outer ends of the booms are supported with bicycle wheels. The attachment of the wheels allows them to caster in making sharp turns. In addition, it allows the boom to be raised or lowered to desired position for various heights of crop. These wheels keep the booms at a uniform distance from the crop regardless of the type of terrain being dusted. A light cable (3/4") extending from the outer end of the boom to the front of the truck and another to the extension behind the truck holds the boom and wheel in proper place when moving forward or back.

The holes in the underside of the boom are 3/8" in diameter and 4" on center. The 3/8" hooks on the top side of each boom are for attaching the canvas trailer made from 10 ounce canvas. The canvas trailer gives protection from wind and allows the dust to settle into the plants. It should be not less than 12 feet long. The efficiency is improved by using longer trailers.

When traveling at a rate of 5 miles per hour this 37 foot duster will cover approximately 20 acres per hour.

The Dust Mixing and Blower Unit

The dust mixing and blower unit consists of an engine, a fan and a dust feeding device. The blower must supply 800 to 1000 cubic feet of air per minute against a static pressure of 6 to 8 inches of water. In securing fans for longer or shorter dusting booms, approximately 26 cubic feet of air per minute against a static pressure of 6 to 8 inches of water should be supplied for each foot of swath that the machine is designed to cover.

Because of the difficulties involved in the construction of a dust feeder and fan, it is recommended that a grower purchase this unit from a reliable
equipment manufacturer.*

Cost of Materials for Dusting Machine Exclusive of Blower Unit

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<th>Item</th>
<th>Quantity</th>
<th>Unit Price</th>
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Summary

Specifications for Dusting Equipment 36-40' width. Tapered boom with trailing canvas.

1. Fan Requirements (Impeller 10" diameter - 3-3/4")
   a. Cubic feet of air per minute - 800-1000.
   b. Static pressure required - 6 to 8" of water.

2. Diameter of flexible tubing from fan - 4".

3. Air Stream Divider - See Distribution Tee on drawing.

4. Boom Specifications (2 booms 18' each, tapered)
   a. Material required for each tapered boom.
      (1) 6' of 3½" - 16 gage steel tubing.
      (2) 6' of 3" - 16 gage steel tubing.
      (3) 6' of 2½" - boiler tubing.
   b. Size of outlets
      (1) 3/8" - 4" on center on bottom side of booms.

* Names of manufacturers and distributors can be secured by writing to the Agricultural Engineering Department, Oregon State College.
5. Quick Coupler for each Boom
   a. One 4" Pierce Irrigation Coupler.
      (1) 1/2 of a coupler welded to each boom.

6. Wheels to support outer end of booms.
   a. 2 front bicycle wheels with forks.
      (Use motorcycle wheels if rough operating conditions
      or larger outfit.)

7. Estimated Power Requirement - 3 to 4 horsepower.

8. Canvas - Two pieces 10-ounce, each 12' x 18'9" equipped to hook
to booms.