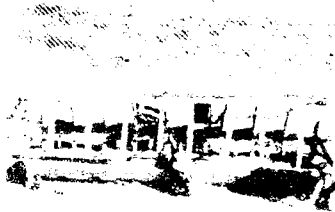


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ENVIRONMENTAL IMPACT
RESEARCH PROGRAM

TECHNICAL REPORT EL-86-46

ROTARY SPREADERS

Section 8.3.1, US ARMY CORPS OF ENGINEERS
WILDLIFE RESOURCES MANAGEMENT MANUAL

by

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An equipment report on rotary spreaders is provided as Section 8.3.1 of the US Army Corps of Engineers Wildlife Resources Management Manual. The report is designed to assist the Corps District or project biologist with the selection and use of types of equipment and materials available for habitat development and manipulation. Topics covered include description, operation, maintenance, limitations, and availability. Rotary spreaders are applicators used to broadcast dry fertilizer, lime, herbicides, or seed over the soil surface. They are commonly used throughout the United States for reclamation and habitat improvement projects. Management objectives for using rotary spreaders are stated, and uses for developing wildlife habitat are discussed. The design and assembly of equipment are described and illustrated, and general specifications are provided. Methods of operation are described, and maintenance and safety requirements are given. Appropriate cautions and limitations are discussed.					
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PREFACE

This work was sponsored by the Office, Chief of Engineers (OCE), US Army, as part of the Environmental Impact Research Program (EIRP), Work Unit 31631, entitled Management of Corps Lands for Wildlife Resource Improvement. The Technical Monitors for the study were Dr. John Bushman and Mr. Earl Eiker, OCE, and Mr. Dave Mathis, Water Resources Support Center.

This report was prepared by Mr. Ted B. Doerr, Range Science Department, Colorado State University, Fort Collins, Colo. Mr. Doerr was employed by the Environmental Laboratory (EL), US Army Engineer Waterways Experiment Station (WES), under an Intergovernmental Personnel Act contract with Colorado State University during the period this report was prepared. Mr. Chester O. Martin, Team Leader, Wildlife Resources Team, Wetlands and Terrestrial Habitat Group (WTHG), EL, was principal investigator for the work unit. Personnel from the following companies supplied information on spreaders: Big Wheel, Inc., Paxton, Ill.; Chadwick, Inc., Sherwood, Oreg.; KMN Modern Farm Equipment, Inc., W. Memphis, Arkansas; Rambling Rotors, Inc., LaGrande, Oreg.; Simplex Manufacturing Company, Portland, Oreg.; and Wilmar-Henderson Manufacturing, Wilmar, Minn. Review and comments were provided by Mr. Martin, WES, and Mr. Larry E. Marcy, Texas A&M University.

The report was prepared under the general supervision of Dr. Hanley K. Smith, Chief, WTHG, EL; Dr. Conrad J. Kirby, Chief, Environmental Resources Division, EL; and Dr. John Harrison, Chief, EL. Dr. Roger T. Saucier, WES, was Program Manager, EIRP. The report was edited by Ms. Jessica S. Ruff of the WES Information Products Division (IPD). Drawings were prepared by Mr. John R. Harris, Scientific Illustrations Section, IPD, under the supervision of Mr. Aubrey W. Stephens, Jr.

COL Allen F. Grum, USA, was the previous Director of WES. COL Dwayne G. Lee, CE, is the present Commander and Director. Dr. Robert W. Whalin is Technical Director.

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NOTE TO READER

This report is designated as Section 8.3.1 in Chapter 8 -- EQUIPMENT, Part 8.3 -- SOIL AMENDMENT EQUIPMENT, of the US ARMY CORPS OF ENGINEERS WILD-LIFE RESOURCES MANAGEMENT MANUAL. Each section of the manual is published as a separate Technical Report but is designed for use as a unit of the manual. For best retrieval, this report should be filed according to section number within Chapter 8.

ROTARY SPREADERS

Section 8.3.1, US ARMY CORPS OF ENGINEERS WILDLIFE RESOURCES MANAGEMENT MANUAL

DESCRIPTION	3	LIMITATIONS	7
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MAINTENANCE	4	LITERATURE CITED	8

Rotary spreaders are applicators used to broadcast dry fertilizer, lime, herbicides, or seed over the soil surface. They range in size from hand-held models to trailer-, truck-, and helicopter-mounted models. Hand-held spreaders are best adapted for treating small areas or sites that are inaccessible to ground equipment. Helicopter-mounted spreaders are used for treating large areas that are inaccessible or too rough for ground machinery. Both hand-held and helicopter-mounted spreaders have been used to seed and fertilize areas to improve forage quantity and quality and to reduce erosion. Trailer- and truck-mounted spreaders are generally used to apply lime and fertilizer over large areas for enhanced plant growth. Rotary spreaders are versatile application tools that are commonly used throughout the United States for reclamation and habitat improvement projects.

DESCRIPTION

Rotary spreaders have a slant-sided hopper that is loaded from the top. Hopper capacities range from less than 1 cu ft (hand-held models) to over 380 cu ft (truck-mounted spreaders) (Larson 1980; Chadwick, Inc. 1983; H. Niemeyer Sohne GMBH and Co. 1983; Wilmar-Henderson Manufacturing 1983a, 1983b). Many small square or round trailer-, truck-, and helicopter-mounted spreaders have an agitator to improve the mixing and flow of the material being spread (H. Niemeyer Sohne GMBH and Co. 1983; Rambling Rotors, Inc. 1983; Simplex Manufacturing Company 1983). The material passes through an opening in the bottom or bottom-rear of the hopper and is dispersed by a spinner or pendulum mechanism. Large rectangular truck- and trailer-mounted spreaders

have a conveyor belt that directs the material to the spinner at the bottom-rear of the hopper. The conveyor belt is powered by a hydraulic or power-take-off (PTO) system (Wilmar-Henderson Manufacturing 1983a, 1983b). The dispersing mechanisms are powered by electric motor, PTO, or hydraulic system. Hand-held models have a hand-crank and gear system that turns the spinner. Generalized spreader designs are shown in Figures 1 and 2; specifications are given in Table 1.

OPERATION

One person is required to operate a spreader, but extra personnel can reduce the time necessary to measure material and reload the hopper. Treatment areas should be premarked so that swath widths are equal and to ensure that no area is missed. Swaths should overlap 50% (which results in double coverage of the area) to ensure complete coverage. The metering of material should reflect the swath overlap. Metering should be verified for accuracy by running material through the spreader into some type of collector while the equipment travels a measured distance at the appropriate application speed. The material in the collectors should then be weighed and the weight to area ratio should be converted to pounds per acre to determine if the correct amount of material is being applied. Adjustments to the hopper opening or conveyor belt speed should then be made to correct any difference between desired and actual application rates. High lime requirements in the eastern United States usually require 2 applications, and the first application should be mixed with the soil by rototilling or disking before the second lime treatment is made.

MAINTENANCE

Rotary spreaders should be cleaned after each use to reduce contamination problems when different materials are used in the same hopper (e.g., lime and plant seed). All chains and sliding parts should be oiled. Rusted areas should be sanded and painted. Simple lubrication and hydraulic system check schedules are supplied by the manufacturer. Hoppers should not be covered when stored.

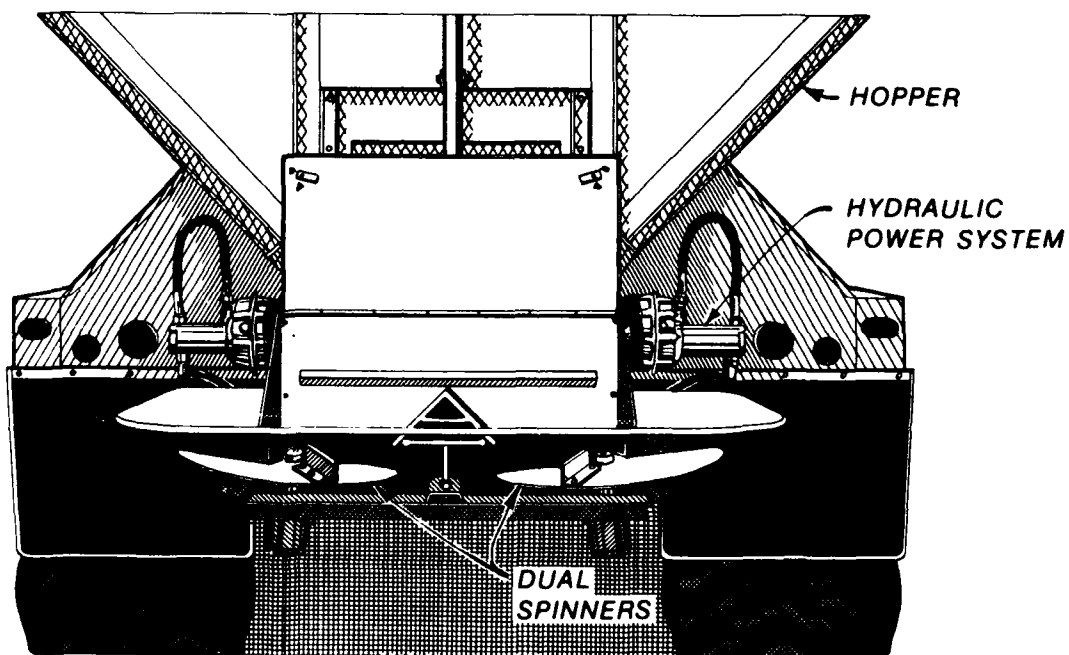
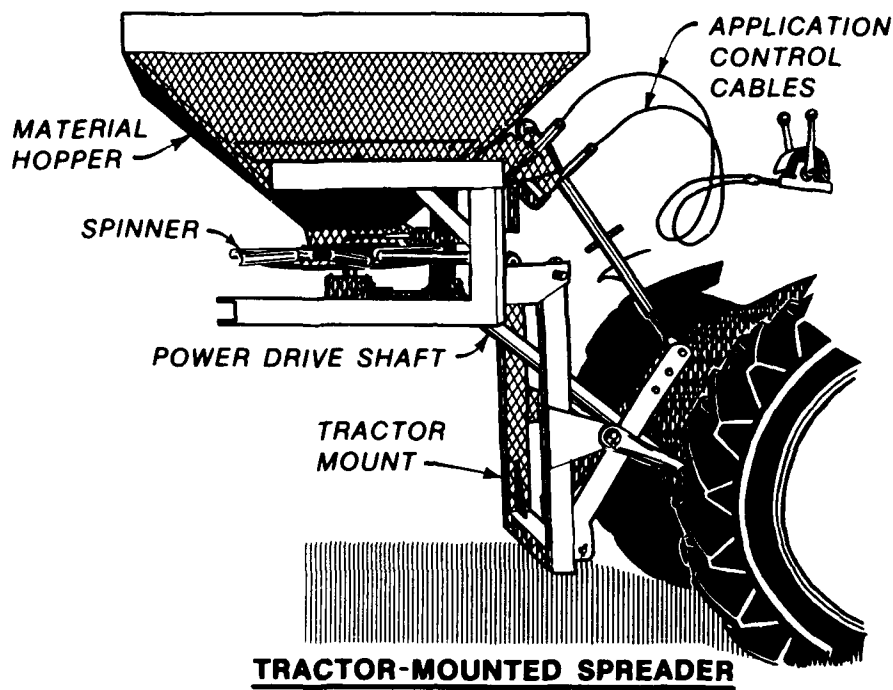
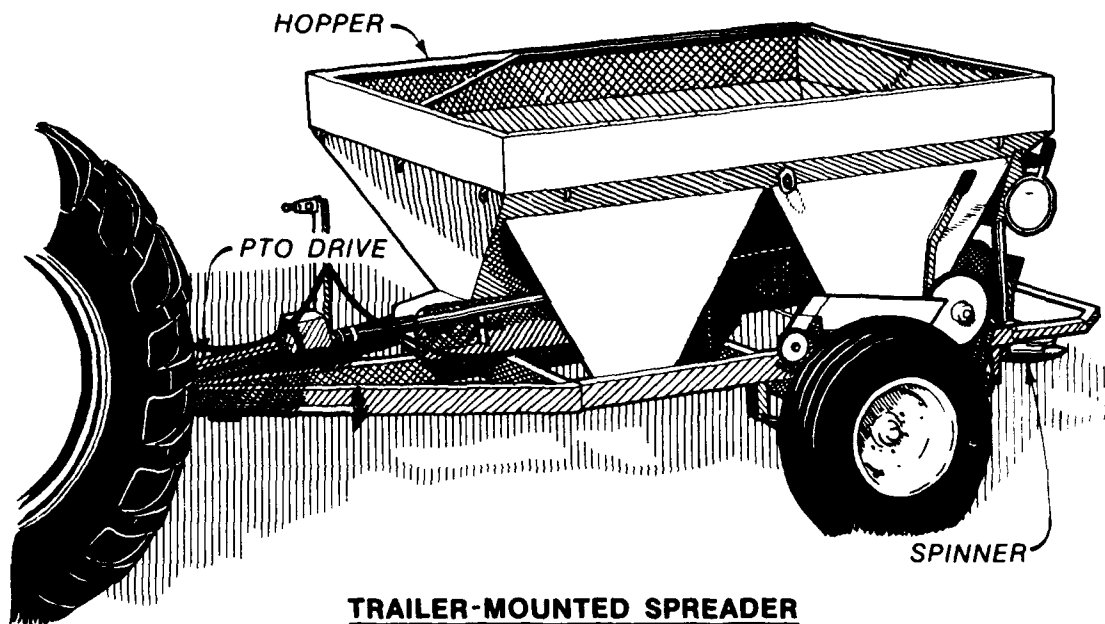


Figure 1. Tractor- and truck-mounted rotary spreaders (adapted from information provided by KMN Modern Farm Equipment, Inc., and Wilmar-Henderson Manufacturing)



TRAILER-MOUNTED SPREADER

Figure 2. Trailer-mounted rotary spreader (adapted from information provided courtesy of Wilmar-Henderson Manufacturing)

Table 1. General specifications for rotary spreaders

Feature	Type of Rotary Spreader			
	Hand-held	Trailer-mounted	Truck-mounted	Helicopter-mounted
Hopper capacity	0.2-0.5 cu ft	35-280 cu ft	175-380 cu ft	20-80 cu ft
Swath widths	4-28 ft	8-80 ft	24-60 ft	25-200 ft
Application rates	--	100-2000 lb/ac	up to 6000 lb/ac	1-400 lb/ac
Operation speed	--	--	20 mph	0-60 mph

LIMITATIONS

Accurate metering and uniform distribution of material is difficult because swath overlap is not usually precise, material is often windblown during application, and material will tend to move by wind and water after application. Rotary spreader seeding rates should be double those of drill seeding because of inaccurate metering and distribution, greater seed predation, and lower seed germination. Trailer- and truck-mounted spreaders are not adapted for use on slopes greater than 18%, in rough topography, or in areas with brush or debris.

AVAILABILITY

Rotary spreaders are available from many sources, including:

Big Wheel, Inc.
P. O. Box 113
Paxton, Illinois 60957

Chadwick, Inc.
11969 SW Herman Road
Sherwood, Oregon 97140

Deere and Company
John Deere Road
Moline, Illinois 61265

KMN Modern Farm Equipment, Inc.
406 Mound City Road
W. Memphis, Arkansas 72301

Rambling Rotors, Inc.
Route 2, P. O. Box 2744
LaGrande, Oregon 97850

Simplex Manufacturing Company
5224 NE 42nd Avenue
Portland, Oregon 97218

Wilmar-Henderson Manufacturing
P. O. Box 957
Wilmar, Minnesota 56201

LITERATURE CITED

- Chadwick, Inc. 1983. C-499 fertilizer bucket specifications. Sherwood, Oreg. 2 pp.
- Larson, J. E. 1980. Revegetation equipment catalogue. USDA For. Serv. Equipment Development Center, Catalogue No. 8042 2501. 198 pp.
- H. Niemeyer Sohne GMBH and Co. 1983. Rotast fertilizer spreaders. Specification sheet. Postfach. 3 pp.
- Rambling Rotors, Inc. 1983. Specification information. LaGrande, Oreg. 1 p.
- Simplex Manufacturing Company. 1983. Model 6000 series-spreaders. Specification sheet. Portland, Oreg. 22 pp.
- Wilmar-Henderson Manufacturing. 1983a. Lime machine-320. Specification sheet. Wilmar, Minn. 2 pp.
- _____. 1983b. Dry spreaders. Specification sheet. Wilmar, Minn. 5 pp.