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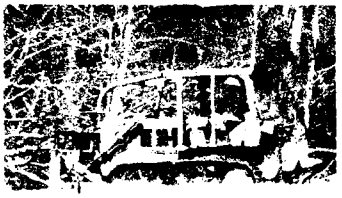
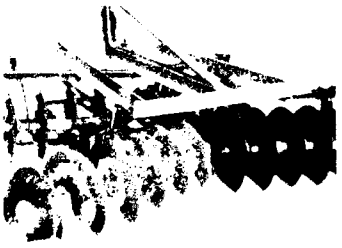
PASTURE DRILLS

Section 8.4.2, US ARMY CORPS OF ENGINEERS WILDLIFE RESOURCES MANAGEMENT MANUAL





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			Drill seeders	Reclamation	Grass-legume mixtures

19 ABSTRACT (Continue on reverse if necessary and identify by block number)

An equipment report on pasture drills is provided as Section 8.4.2 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 and maintenance, limitations, and availability.

Pasture drills are heavy-duty grain drills that combine certain qualities of grain drills and the rangeland drill. They are used widely throughout the United States for seeding reclamation projects, livestock forage pastures, and wildlife food plots. Management objectives for using pasture drills are stated, and applications to development of 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. The author wishes to thank the following persons for providing information and photographs used in this report: Mr. A. L. Higgons, Horizon Seeds, Inc., Lincoln, Nebr.; Mr. A. J. Truax, Truax Company, Minneapolis, Minn.; and Mr. A. O. Smith, The Tye Company, Lockney, Tex. 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 8.4.2 in Chapter 8 -- EQUIPMENT, Part 8.4 -- DRILL AND BROADCAST SEEDERS, of the US ARMY CORPS OF ENGINEERS WILDLIFE 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.

PASTURE DRILLS

Section 8.4.2, US ARMY CORPS OF ENGINEERS
WILDLIFE RESOURCES MANAGEMENT MANUAL

Pasture drills are heavy-duty grain drills that combine certain qualities of grain drills and the rangeland drill and were originally designed for seeding simple mixtures to improve pastureland. They are of greatest use in areas with less site preparation than required by grain drills but are not as durable as the rangeland drill on extremely rough sites (Larson 1980). However, several companies are developing modifications to the pasture drill to improve seeding capabilities on range sites (The Tye Company 1982; Jim Truax, Truax Company, pers. commun., 1983). Pasture drills are used widely throughout the United States for seeding reclamation projects, livestock forage pastures, and wildlife food plots.

DESCRIPTION

Pasture drills feature multiple seedboxes on a heavy-duty frame from 7 to 16 ft wide (Figs. 1 and 2a). Chisel type or double-disk furrow openers can be used on pasture drills, but double-disk openers are more common and articulate individually to reduce breakage when going over small obstacles. Packer wheels are used to cover the furrows more often than chain drags, which are used on the rangeland drill. Oversized seed tubes are located between the double disks to ensure excellent seed placement and allow easier passage of "fluffy" warm-season grass seeds (Fig. 2b). Row spacing varies between 6 and 10 in. (see Table 1 for variations in brands of drills). The number of rows can vary from 8 in small drills to 20 rows in larger drills. Pasture drills usually have a grass seedbox and legume seedbox; however, some brands have extra boxes for special seed types or for applying fertilizer and seed in one

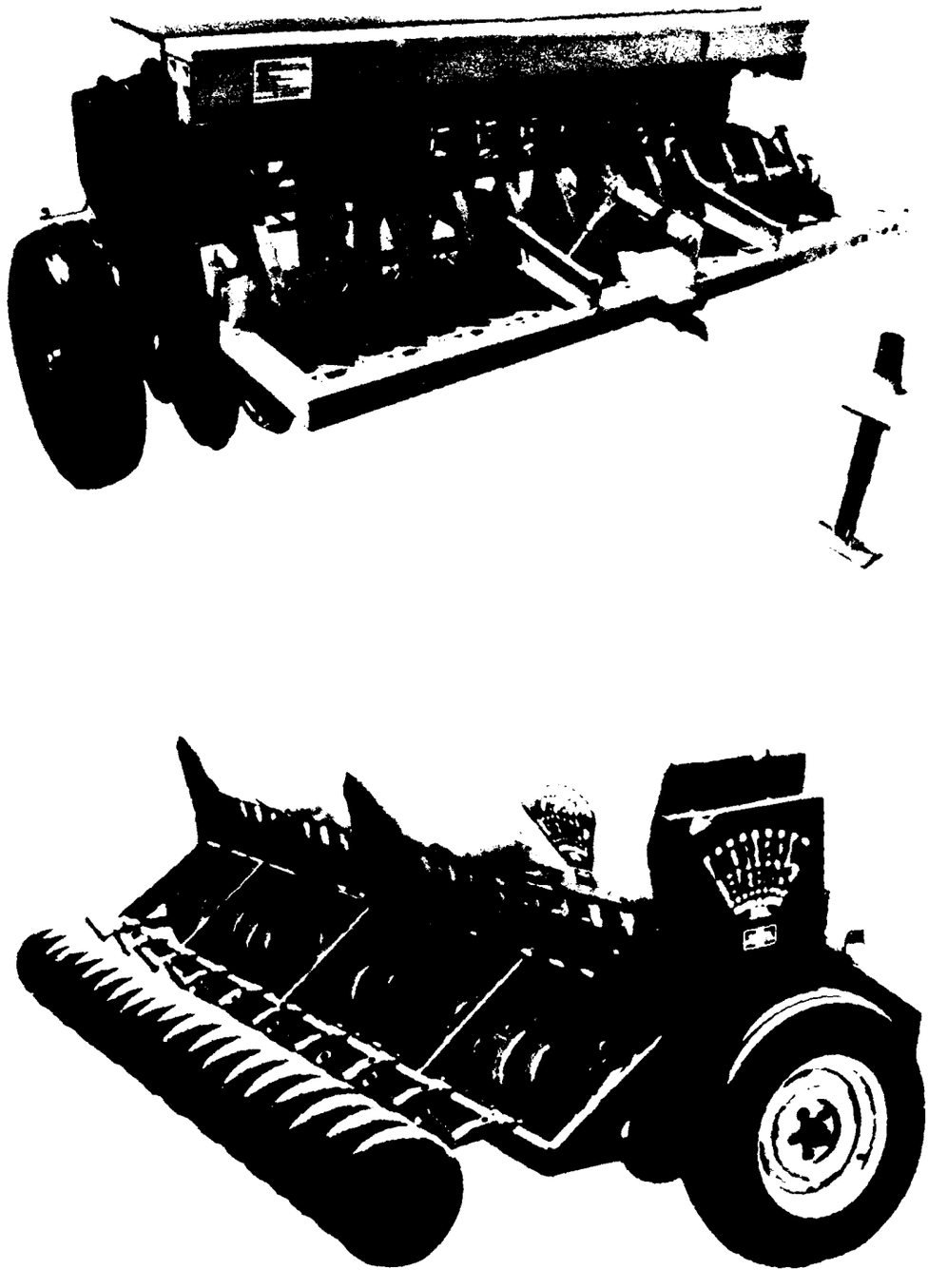
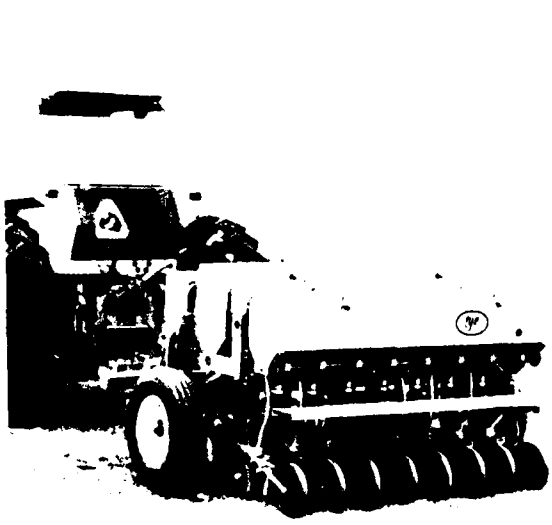
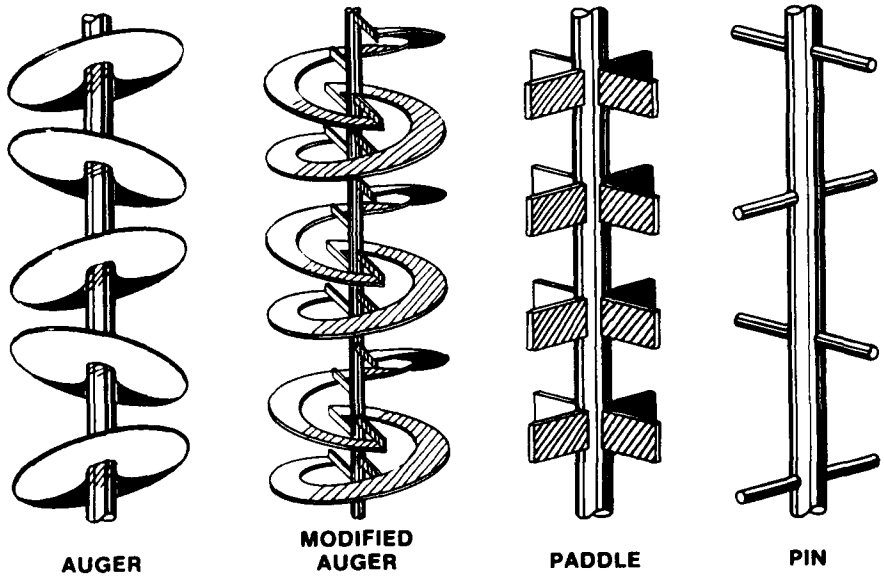


Figure 1. Truax Model 812 (top) and Horizon 14-row model (bottom) pasture drills. Note packer wheels on the Horizon drill (courtesy Truax Company and Horizon Seeds, Inc.)



a. Reclamation Special

b. Furrow openers



c. Seedbox agitators

Figure 2. Selected features of pasture drills: (a) Reclamation Special pasture drill showing multiple seedboxes (courtesy the Tye Company), (b) double-disk furrow openers with depth bands and oversized seed tubes (courtesy Horizon Seeds, Inc.), and (c) types of seedbox agitators (adapted from photos supplied by Horizon Seeds, Inc., Truax Company, and Texas Agricultural Experiment Station)

Table 1. Specifications for pasture drills

Feature	Brand		
	Horizon	Truax	Tye
Available models	14-row model 20-row model	Model 88 Model 812	Model 80 (All models available in the Grass Drill and Reclamation Special) Model 120 Model 160
Furrow openers	Double disk	Double disk	Double disk
Furrow depth	0.5 in.	0.5, 0.75, 1.0, 1.25, 1.5 in.	1.0, 1.6, or 2.3 in.
Furrow spacing	7 in.	8 in.	8-10 in.
Furrow cover mechanism	Packer wheel or drag chain	Packer wheel	Packer wheel
Number of furrows	14-row model: 14 20-row model: 20	Model 88: 8 Model 812: 12	Model 80: to 8 Model 120: to 14 Model 160: to 20
Seedbox types and capacities	14-row model grass: 10-12 bu legume: 2-3 bu 20-row model grass: 15-18 bu legume: 4-5 bu	Model 88 cool-season grass: 5.5 bu legume: 1.0 bu Model 812 cool-season grass: 7.5 bu legume: 1.5 bu warm-season grass: 7.5 bu	Model 80 grass/grain: 11.9 bu legume: 2.1 bu warm-season grass: 6.3 bu Model 120 grass/grain: 17.0 bu legume: 3.0 bu warm-season grass: 9.0 bu Model 160 grass/grain: 23.8 bu legume: 4.2 bu warm-season grass: 12.6 bu
Seedbox agitators	Paddle	Auger; pin	Auger
Overall drill width	14-row model: 88 ft 20-row model: 12.0 ft	Model 88: 80 ft Model 812: 10.0 ft	Model 80: 7.2 ft Model 120: 10.5 ft Model 160: 14.3 ft

(Continued)

Table 1 (Concluded)

Feature	Brand		
	Horizon	Truax	Tye
Power requirements	14-row model: 25 hp	Model 88: 30 hp	Model 80: 40 hp (with lift assist)
	20-row model: 35 hp	Model 812: 40 hp	Model 120: 50 hp (with lift assist) Model 160: 80 hp (with lift assist)
Area seeded/hour	14 row model: 4 ac/hr 20 row model: 5 ac/hr	Model 88: 3 ac/hr Model 812: 4 ac/hr	Model 80: 3 ac/hr Model 120: 4 ac/hr Model 160: 6 ac/hr
Optimum seeding speed	6-7 mph	4-5 mph	3.5-4 mph

operation. Warm-season, fluffy seedboxes use modifications similar to those found on rangeland drill fluffy seedboxes (Wiedemann 1982). Paddle- or auger-type seedbox agitators are most common (Fig. 2c). Seedbox capacities vary between 1 bu on small legume boxes to 18 bu on large grass boxes.

OPERATION

Power requirements for pasture drills range from 25 to 150 hp (Larson 1980). Horizon brand drills require 25 hp for the 9-ft model and 35 hp for the 12-ft model (Horizon Seeds, Inc. 1983). Truax brand drills require 30 hp for their 8-ft Model 88 and 40 hp for the 10-ft Model 812 (Truax Company 1983a, 1983b). Tye drills require 40, 50, and 80 hp for Models 80, 120, and 160, respectively, if they have a lift-assist wheel (The Tye Company 1982). Otherwise, these drills require 60 to 150 hp. Most drills have an optimal operation speed between 3.5 and 5 mph and can seed 3 to 6 acres/hour depending on site conditions and the brand of drill being used. Pasture drills require only 1 person for operation, and no special safety precautions are necessary. Truax and Horizon brand drills have a cover for the roller chain seed drive mechanism to protect the machinery and ensure that hands or clothing are not accidentally caught in the chains.

MAINTENANCE

Little maintenance is required for pasture drills. All bearings are sealed and require lubrication once every 1 to 3 years. Chains and hinges should be checked daily and cleaned and oiled when necessary. Some drills, such as the Horizon brand models, require daily lubrication of clutch and drive fitting. Drills should be protected from inclement weather when possible.

LIMITATIONS

Pasture drills are not as durable as the rangeland drill when used on rocky, rough terrain and should not be operated on slopes greater than 18%. Vegetation establishment is not as successful when seeding is accomplished on wet soils that clog seed tubes and on dry soils that become powdery (loose soil structure) as heavy equipment passes over the surface.

AVAILABILITY

Pasture drills are available from several companies, including:

Horizon Seeds, Inc.
P. O. Box 81823
Lincoln, Nebraska 68501

Marliss Industries
P. O. Box 3097
Jonesboro, Arkansas 72403

Truax Company
3717 Vera Cruz Avenue
Minneapolis, Minnesota 55422

The Tye Company
P. O. Box 218
Lockney, Texas 79241

LITERATURE CITED

Horizon Seeds, Inc. 1983. Horizon grass drill. Information Sheet. 2 pp.

Larson, T. E. 1980. Revegetation equipment catalogue. USDA For. Serv. Equipment Development Center, Catalogue No. 8042 2501. 198 pp.

The Tye Company. 1982. Tye no tills. Information sheet. Form 502. 4 pp.

Truax Company. 1983a. Native grass drill - Model 88. Information sheet. 2 pp.

_____. 1983b. Native grass drill - Model 812. Information sheet. 6 pp.

Wiedemann, H. T. 1982. Fluffy grass seed metering device for rangeland seeders. Pages 178-182 In Reclamation of Mined Lands in the Southwest. Albuquerque, New Mexico. 217 pp.