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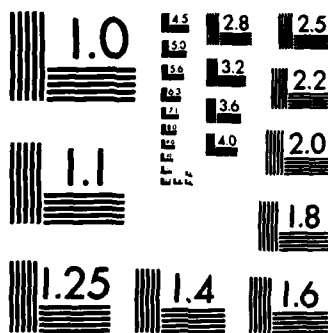
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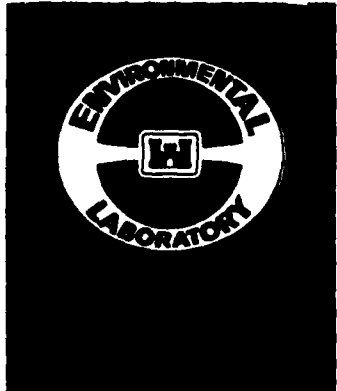
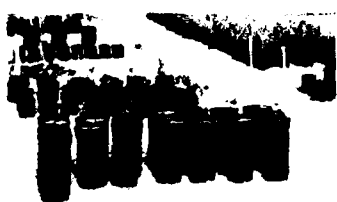
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ENVIRONMENTAL IMPACT RESEARCH PROGRAM

TECHNICAL REPORT EL-86-24

DOVEWEEDS (*Croton* spp.)

Section 7.4.2, US ARMY CORPS OF ENGINEERS
WILDLIFE RESOURCES MANAGEMENT MANUAL

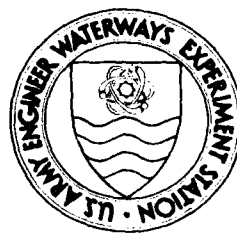
by

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19. ABSTRACT (Continue on reverse if necessary and identify by block number) A plant materials report on dove weeds (Croton spp.) is provided as Section 7.4.2 of the US Army Corps of Engineers Wildlife Resources Management Manual. The report was prepared as a guide to assist the Corps District or project biologist in the selection, cultivation, and management of suitable plant materials for wildlife and habitat development programs. Major topics covered include description, distribution, habitat requirements, wildlife value, establishment, and maintenance. The crotons, commonly referred to as dove weeds, include several species known to be important food plants for upland game birds. Diagnostic features of the genus <i>Croton</i> are described, and growth and habitat characteristics are given for six species that are of value to wildlife. Regional and seasonal variation in use by wildlife is described, with emphasis on use by the mourning dove (<i>Zenaidura macroura</i>) and northern bobwhite (<i>Colinus virginianus</i>). Guidelines are provided for establishing, cultivating, and maintaining stands of dove weeds on project lands.					
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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. Larry E. Marcy, Department of Wildlife and Fisheries Sciences, Texas A&M University, College Station, Tex., and Mr. Chester O. Martin, Wetlands and Terrestrial Habitat Group (WTHG), Environmental Laboratory (EL), US Army Engineer Waterways Experiment Station (WES). Mr. Marcy was employed by WES under an Intergovernmental Personnel Act contract with Texas A&M University during the period this report was prepared. Mr. Martin, Team Leader, Wildlife Resources Team, WTHG, was principal investigator for the work unit. Review and comments were provided by Dr. Wilma A. Mitchell, WES, and Mr. Ted B. Doerr, Range Science Department, Colorado State 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 Publications and Graphic Arts Division (PGAD). Drawings were prepared by Mr. David R. (Randy) Kleinman, Scientific Illustrations Section, PGAD, under the supervision of Mr. Aubrey W. Stephens, Jr.

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NOTE TO READER

This report is designated as Section 7.4.2 in Chapter 7 -- PLANT MATERIALS, Part 7.4 -- MISCELLANEOUS FORBS AND HERBACEOUS SPECIES, 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 7.

DOVEWEEDS (*Croton* spp.)

Section 7.4.2, US ARMY CORPS OF ENGINEERS WILDLIFE RESOURCES MANAGEMENT MANUAL

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The crotons (Family Euphorbiaceae), commonly referred to as dove weeds, include several species known to be important food plants for upland game birds. Approximately 30 species of *Croton* are found in the United States, with the genus being best represented in the South (Coastal Zone Resources Division 1978). Species reported most frequently as wildlife foods are woolly croton (*C. capitatus*), common or tropic croton (*C. glandulosus*), one-seed croton or prairie tea (*C. monanthogynus*), Texas dove weed (*C. texensis*), Lindheimer's croton (*C. lindheimerianus*), and beach-tea or silver-leaf croton (*C. punctatus*). Other common names for woolly croton are hogwort, goatweed, stinkweed, and wildsage.

DESCRIPTION

Crotons are erect, monoecious, annual or perennial herbs (rarely shrubs) 6 to 25 in. (15 to 65 cm) tall with profusely branching stems (Radford et al. 1968). The illustration of woolly croton provided in Figure 1 shows the basic characteristics of dove weeds. Most species are covered with a dense whitish or tawny stellate pubescence. Leaves are petiolate, unlobed, and alternate but appear opposite or whorled just below the inflorescence; most species have entire leaf margins. Flowering begins in June and continues through August as new branches with inflorescences are formed. The inflorescence is an abbreviated terminal raceme with pistillate flowers below staminate flowers. The



Figure 1. Distribution and distinguishing characteristics of woolly croton (*Croton capitatus*): (a) flowering branch, (b) fruit, and (c) seeds

ovary is 3-celled, and the capsule is 3-celled and 3-seeded except for *C. monanthogynus*, which is 1-seeded. When seeds mature in late fall, they are forcefully ejected several feet from the parent plant (Coastal Zone Resources Division 1978). Seeds are glossy brown to gray, ovoid or oblong, with a caruncle at the base (Radford et al. 1968).

DISTRIBUTION

Crotons are found throughout the southeastern, east-central, and midwestern states. Species widespread throughout the southeastern and central states are woolly croton (Fig. 1) and one-seed croton. Other major species in the Southeast are tropic croton and Lindheimer's croton, which have been reported from North Carolina through the Gulf Coast States to west Texas. Beach-tea is strictly a coastal species present from North Carolina to Texas, and Texas doveweed is a western species that is widespread from Texas to Arizona and north to Wyoming and South Dakota.

HABITAT REQUIREMENTS

Doveweeds occur in sandy fields, disturbed grasslands, and waste places, and are often dominant in heavily grazed pastures (Korschgen 1958). Full sunlight, soil disturbance, and an absence of competitive plants are necessary for maximum growth and seed production. Most species are adapted to a variety of soil types, but sandy to sandy loam soils are preferred; however, one-seed croton is most commonly found on calcareous soils. Best growth and seed production for woolly croton occur on soils with a pH between 4.8 and 7.2, and tropic croton requires a pH from 5.5 to 7.0 (Coastal Zone Resources Division 1978). Crotons are drought tolerant and adaptable to areas of sporadic rainfall (Goodrum and Reid 1954). Table 1 provides general information on growth characteristics and habitat requirements of several species of doveweeds used by wildlife.

WILDLIFE VALUE

Doveweeds are known to be of greatest management value to the mourning dove (*Zenaida macroura*) and northern bobwhite (*Colinus virginianus*). Although doves subsist primarily on seeds of cultivated crops, weed seeds are important fall and winter foods when waste grain is in short supply (McClure 1943, Neely 1961, Griffing and Davis 1974). Results of several studies in the southern

Table 1. Growth and habitat characteristics of doveweeds*

Species	Habit	Habitat and Soils
<i>C. capitatus</i>	Robust taprooted annual to approx. 4 ft tall; usually widely branched.	Sandy soils; plains, openings, and waste places; wide soil adaptation--occurs on good cropland soils, droughty soils, and relatively wet soils.
<i>C. glandulosus</i>	Taprooted annual to approx. 2 ft tall, usually much shorter; stems freely branched, ascending; several intergrading races.	Typically tropical or subtropical; fields, roadsides, prairies, and openings; widespread in open sandy and loamy areas and locally in heavy coastal sands, clay, and caliche.
<i>C. monanthogynus</i>	Taprooted annual herb to approx. 15 in. tall; profusely and widely branched.	Calcareous soils, limestone regions; heavier loams, clay or caliche in prairies, openings, and waste places.
<i>C. texensis</i>	Annual herb to approx. 2-1/2 ft tall.	Sandy loams; prairies, openings, and stream bottoms; also scattered in loose blowing sands.
<i>C. lindheimerianus</i>	Taprooted annual to approx. 1-1/2 ft tall; profusely and widely branched.	Locally abundant in pastures and fields, usually disturbed sites; sandy or alluvial soils of desertic flats or floodplains; heavier loams or caliche in coastal prairies.
<i>C. punctatus</i>	Annual or perennial herb or usually a subshrub to approx. 1-1/2 ft tall; perennial plants tend to be woody at the base, with new shoots arising from old stems.	Locally abundant in loose deep sands of coastal regions; dunes of barrier islands and occasionally mainland beaches; salt tolerant and occurs commonly on dredged material sites.

* Major references: Fessler (1960), Radford et al. (1968), Correll and Johnston (1970), Jones (1975), Coastal Zone Resources Division (1978).

United States indicate that the importance of croton as a dove food is dependent largely upon availability (Table 2). Greatest use has been reported in Florida (Beckwith 1959), Texas (Dillon 1961), and New Mexico (Griffing and Davis 1974).

Croton has been reported as a choice bobwhite quail food in Texas (Lay 1940, Lehmann and Ward 1941), but regional importance is determined by the availability of croton and the abundance of agricultural grain crops and legumes (Davison 1942, 1958; McRae et al. 1980) (Table 3). In southwest Texas, Lehmann and Ward (1941) found that doveweeds composed 20.1% by volume of winter quail crops examined, and in east Texas woolly croton was ranked second in importance as a winter quail food, averaging 27.3% by volume of stomachs sampled. Several studies showed that doveweeds were of lesser importance to quail in the midwestern and southeastern states (Johnson 1940, Davison 1942, Speake 1960).

Doveweeds have also been reported as supplying important fall and winter food for scaled quail (*Callipepla squamata*) and Rio Grande turkey (*Meleagris gallopavo intermedia*). In southern Texas, woolly croton occurred with a frequency of 6.0% and measured 4.0% by volume in scaled quail crops sampled in December and January (Lehmann and Ward 1941). At least 4 species of croton (*C. capitatus*, *C. glandulosus*, *C. texensis*, and *C. monanthogynus*) have been reported as turkey foods (Korschgen 1967). Crops examined from Brooks County, Texas, showed that crotons comprised 46.8% of the November-December diet, and a study on the King Ranch in south Texas reported a year-round average of 6.7% croton by volume, with greatest use occurring in the fall. However, only trace amounts were found in crops of birds sampled in the Edwards Plateau region of south-central Texas (Korschgen 1967).

Other species known to eat croton seeds include the white-winged dove (*Zenaida asiatica*), common ground-dove (*Columbina passerina*), northern cardinal (*Cardinalis cardinalis*), pyrrhuloxia (*Cardinalis sinuatus*), lark sparrow (*Chondestes grammacus*), white-throated sparrow (*Zonotrichia albicollis*), red-winged blackbird (*Agelaius phoeniceus*), brown-headed cowbird (*Molothrus ater*), and rodents such as pocket mice (*Perognathus* spp.). White-tailed deer (*Odocoileus virginianus*) are known to browse the foliage (Martin et al. 1951, Davison 1967, Buckner et al. 1979). Robust stands provide some cover for birds and small mammals (Coastal Zone Resources Division 1978).

Table 2. Examples of regional and seasonal variation in croton use by mourning dove

Study Location	Sample Period	Species	Sample Size	% Occurrence	% Volume	Reference
Central Virginia	Sep-Nov (1959)	<i>Croton</i> spp.	238	0.3	0.5	Chamberlain 1965
North-central Florida	Oct (1952-1954)	<i>Croton</i> spp.	90	38.0	4.7	Beckwith 1959
	Dec (1950-1952)	<i>Croton</i> spp.	50	12.0	0.2	
Southeast Florida	Oct (1950)	<i>Croton</i> spp.	137	21.0	13.2	Beckwith 1959
South-central Illinois	Sep (1948-1955)	<i>C. capitatus</i>	1,142	3.7	0.4	Oberheu and
		<i>C. glandulosus</i>		12.6	3.5	Klimstra 1962
		<i>C. monanthogynus</i>		3.7	0.6	
Missouri	May-Sep (1946-1954)	<i>C. capitatus</i>	1,959	8.6	1.3	Korschgen 1958
		<i>C. glandulosus</i>		6.1	1.4	
		<i>C. monanthogynus</i>		4.4	0.3	
Northwest Oklahoma	June-Oct (1968)	<i>Croton</i> spp.	546	26.9	7.6	Carpenter 1971
Southwest Oklahoma	Sep (1976-1977)	<i>Croton</i> spp.	75	10.6	0.5	Tyler and Jenkins 1979
Texas*	Sep-Oct (1957-1959)	<i>C. capitatus</i>	651	10.0	5.4	Dillon 1961
		<i>C. glandulosus</i>		3.0	5.4	
		<i>C. monanthogynus</i>		46.0	18.8	
		<i>C. texensis</i>		17.0	4.0	
		<i>C. lindheimerianus</i>		5.0	1.4	
South-central New Mexico	July-Sep (1967)	<i>Croton</i> spp.	38	2.6	0.1	Davis 1974
	Oct-Mar (1967-1968)	<i>Croton</i> spp.	42	2.4	0.5	
Southeast New Mexico	July-Aug (1971)	<i>Croton</i> spp.	19-10	74.0	81.1	Griffing and
	Dec-Jan (1971-1972)	<i>Croton</i> spp.	24-23	46.0	1.6	Davis 1974

* Texas samples were from 43 counties scattered throughout the state.

Table 3. Examples of regional and seasonal variation in croton use by bobwhite quail

Study Location	Sample Period	Species	Sample Size	% Occurrence	% Volume	Reference
Missouri	Nov-Jan (1941-1942)	<i>C. capitatus</i>	5,472	5.6	1.1	Korschgen 1948
		<i>C. glandulosus</i>		3.1	0.6	
		<i>C. monanthogynus</i>		10.0	1.7	
					3.4	
Alabama	Oct-Nov (1955-1958)	<i>Croton</i> spp.	86	*	4.2	Speake 1960
Mississippi	Nov-Feb (1937-1940)	<i>Croton</i> spp.	1,835	*	1.3	Johnson 1940
Southeastern U.S., east of Miss. River	Nov-Feb (1937-1940)	<i>C. capitatus</i>	5,189	*	0.5	Davison 1942
East Texas	Dec-Mar (1936-1937)	<i>C. capitatus</i>	56	73.0	27.3	Lay 1940
Southwest Texas	Dec-Jan (1934-1935)	<i>C. capitatus</i>	565	20.9	8.9	Lehmann and Ward 1941
		<i>C. texensis</i>		4.4	5.6	
		<i>C. punctatus</i>		11.0	5.6	
					20.1	

* Data not provided in literature.

ESTABLISHMENT

Development of an existing seed source is the most cost-effective means of establishing croton. In areas where croton occurs naturally, sufficient seed are often present to establish a stand by shallow plowing or disking (Neely 1961).

Site Selection

Crotons are suited to establishment on many upland sites in the southern states (Neely 1961); pastures, oldfields, and disturbed sites provide the best locations for food plots. Sites should be located near adequate escape cover and should have minimum overstory shade. Reconnaissance of prospective sites should be done during September and early October to locate areas that have natural stands of croton to use as a seed source. Natural stands are found most commonly in overgrazed pastures and along borders of plowed fields (Davison and Sullivan 1963). Figure 2 shows an extensive stand of woolly croton in an oldfield situation.

Site Preparation

Shallow plowing or disking is often all that is needed to increase the production of doveweeds. The best time for disking is January to March, and the soil should be cut just deep enough (usually 4 in.) to turn over grasses (Lay 1969). Fertilizer is required only if the site is excessively sterile; a 5-10-10 or 10-10-10 ratio applied during site preparation or seeding can increase establishment rate and production (Coastal Zone Resources Division 1978). A minimum amount of fertilizer should be used, as too much will stimulate rapid growth of competitive grasses and forbs.

The size of plots will vary, but small plots of approximately 1/4 acre interspersed with good cover are more beneficial to wildlife than larger plots. Long rectangular strips are better than square blocks of the same acreage.

Planting

Establishment of new croton food plots can be accomplished by seeding. Seeds are generally not available from commercial sources but may be obtained from natural stands or as a waste product from agricultural seed-cleaning operations. If such sources are not available, croton plants may be harvested by hand in late fall and air-dried on tarpaulins to catch the seeds. Seeds



Figure 2. A natural stand of woolly croton (*Croton capitatus*) in an oldfield in eastern Texas.

should be kept in dry cold storage until time for planting. Scarification by mechanical means or treatment with a solution of sulfuric acid aids seed germination (Coastal Zone Resources Division 1978).

Seeds may be either broadcast or planted in rows at a rate of 15 to 20 lb/acre in late winter or early spring. Spacing can be regulated by planting in rows 3 ft apart. Spacing between plants within a row should be approximately 2 ft for maximum growth and seed production (Fessler 1960, Neely 1961).

MAINTENANCE

The low tolerance of croton to competitive plant species and shade requires that food plots receive periodic maintenance. Competition from other plants, primarily grasses, causes decreased croton seed production. A study in Tennessee showed that unmanaged plots of croton produced excellent stands

the first year, but only a few plants were present the second year due to dense stands of annual weeds (Fessler 1960).

Rotation of food plot sites is often necessary to maintain good growth and seed production (Lay 1969). Alternate strips should be used the second year following stand establishment. When grasses and weeds begin to suppress the growth of croton in old strips, production can be increased by mechanical manipulation or burning in late winter or early spring. Lay (1969) recommended plowing or disking every 2 years to maintain croton stands. Buckner et al. (1979) found increased production of seeds following single chopping of longleaf pine (*Pinus palustris*) sites. Burning prior to chopping had little effect on production, but January burning on unchopped sites was more beneficial than burning in May; late burning destroyed newly established seedlings. Brush control may be required where encroachment of woody species is a problem.

CAUTIONS AND LIMITATIONS

The greatest drawbacks of planting croton are the lack of a commercial seed source and the expense in manpower and time required to collect seeds from natural stands. However, if food plots are properly maintained, reseeding should occur naturally.

Croton may readily spread into areas outside the food plot when adjacent sites are disturbed and overgrazed. Controlling croton expansion where it is unwanted can be accomplished by mowing at least once or twice a year (Fessler 1960). Croton is unpalatable to livestock because of an oil produced in the seeds and leaves; although it is a powerful cathartic capable of killing cattle, live plants usually are so unpalatable that livestock rarely ingest sufficient quantities to cause illness or death (Schmutz and Hamilton 1979).

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