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RIGID CANOPY TRAP FOR TABANIDAE (DIPTERA)[1]

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ABSTRACT

Specifications are given for construction of a rigid canopy trap which will withstand continuous exposure in coastal salt marshes. Collections of adult tabanids by this trap included large numbers of a greater variety of species than were collected by a New Jersey box trap (a modified "Manning trap").

Key Words: Tabanidae, trap, horse flies, deer flies, sampling, salt marsh

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Management of biting fly populations, like any other insect pest management program, requires some convenient, reliable sampling method. Horse flies and deer flies (Diptera: Tabanidae) are important pests of man and livestock. A variety of adult trapping methods have been used by many researchers for routine collecting, population monitoring and, in a few cases, as control measures. These include: sticky surfaces, malaise traps, box traps, and canopy traps. These have been used with and without carbon dioxide as an added attractant. The box trap is a broad term which includes the Manning trap and canopy trap is a broad term which includes the Manitoba trap. As originally described, the Manning trap and the Manitoba trap use a dark decoy below the box or canopy. Many modifications of these traps have been used. The following references (and literature cited therein) document these changes and uses: Adkins et al. 1972; Blume et al. 1972; Bracken and Thorsteinson 1965; Bracken et al. 1965; Catts 1970; DeFoliart and Morris 1967; Granger 1970; Hansens et al. 1971; Neys et al. 1971; Smith et al. 1965; Thompson 1969; Thorsteinson et al. 1965; 1966; Wilson 1968.

We experienced difficulties with various versions of the canopy traps when operated continuously and near coastal salt marshes. The heavy rains and wind caused such frequent damage to the traps that they were impractical. Consequently, we have designed and used in North Carolina a rigid canopy trap which is described herein. This trap is basically a modification of the canopy traps described by Catts (1970) and Adkins et al. (1972). It is similar to the "Manitoba trap" illustrated by Hansens et al. (1971), except it is larger and a black sphere is suspended inside.

To evaluate the effectiveness, we operated a rigid canopy trap and a box trap 75 meters apart in the upland margins of coastal salt marshes at five locations in Carteret County, North Carolina, for 24 weeks in 1972. A total of 10 pairs of traps was used. The box trap was similar to the "Manning trap" used in New Jersey and illustrated by Hansens et al. (1971), except it was painted all black and a decoy was not used. This box was 32 in (81.2cm) on each side, 16 in (40.6cm) high and supported about 2 ft (30.5cm) above the ground on four legs. Flies entered the open bottom of the box and were prevented from escaping by internal screen baffles and a screen top.

TRAP CONSTRUCTION

The trap (Fig. 1) is a pyramid supported on four legs and covered by a permanently attached canopy topped by a removable no-return holding cage. The rigid framework of the trap is constructed of wooden parts secured by stove bolts and angled metal brackets. To facilitate purchase of standard materials in the United States, construction directions are given in the English system. The top platform is constructed from two 9 inch squares cut from ½inch plywood. The diameter of the circular opening in the upper square is 4.5 inches; the lower one is 5.25 inches. When sandwiched together, a ledge is formed by the lower square that supports the no-return assembly (Fig. 2). To the underside of the platform are fastened 4 metal leg brackets (135° angle). The legs are 2 x 2 x 84 inches with the upper end cut at 45° and attached to the platform brackets with round-head stove bolts. The leg braces are 1 x 2 x

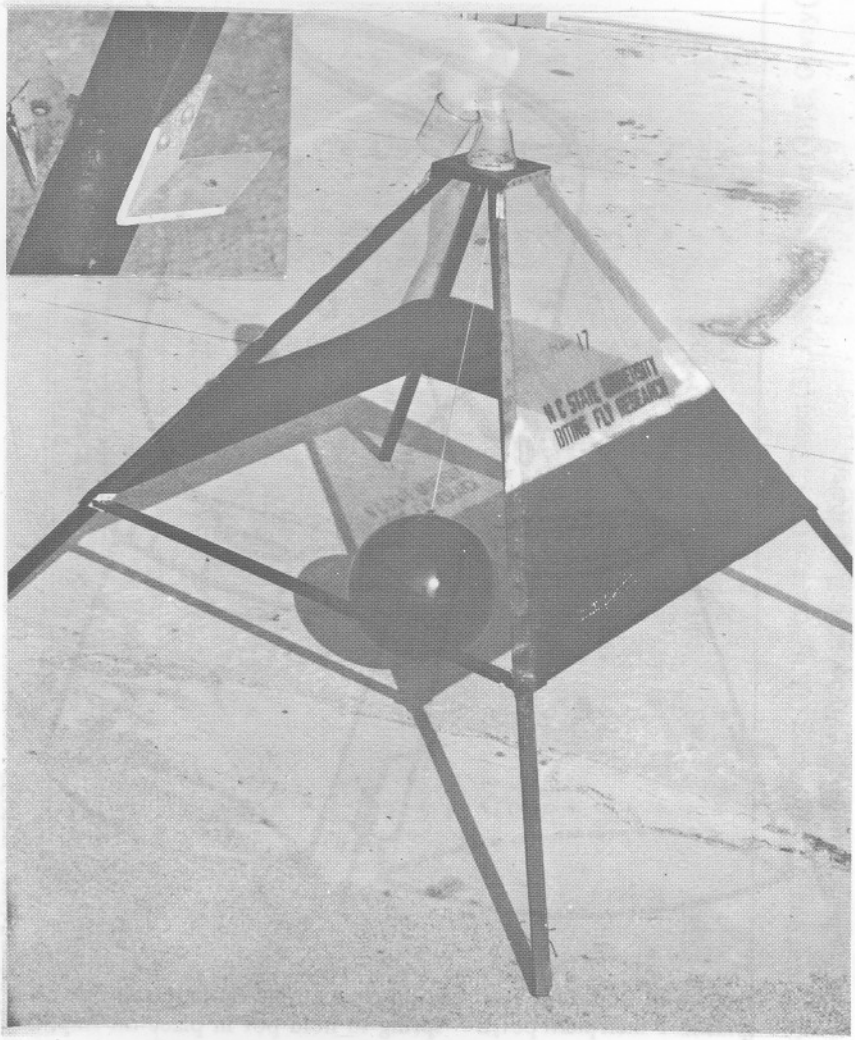

Fig. 1. Rigid canopy trap with plastic-coated screen on one side removed to show frame. Insert: metal leg brace bracket cut at 45° angle from aluminum channel.

57 inches with each end cut at 45°. The braces are attached to the leg at a distance of 31 inches from the top of the leg by a 2 x 2 x 2 x 3/8 inch bracket cut at 45° from aluminum channel (Fig. 1, insert).

Each side of the canopy is constructed of a trapezoidal sheet of 9 mesh aluminum screen imbedded in clear plastic ("Sunray Glass," 48 inches wide, Sears Roebuck & Co.) measuring 9 inches on the top, 62 inches on the bottom and 54.5 inches on each side. The screen is stapled to the pre-

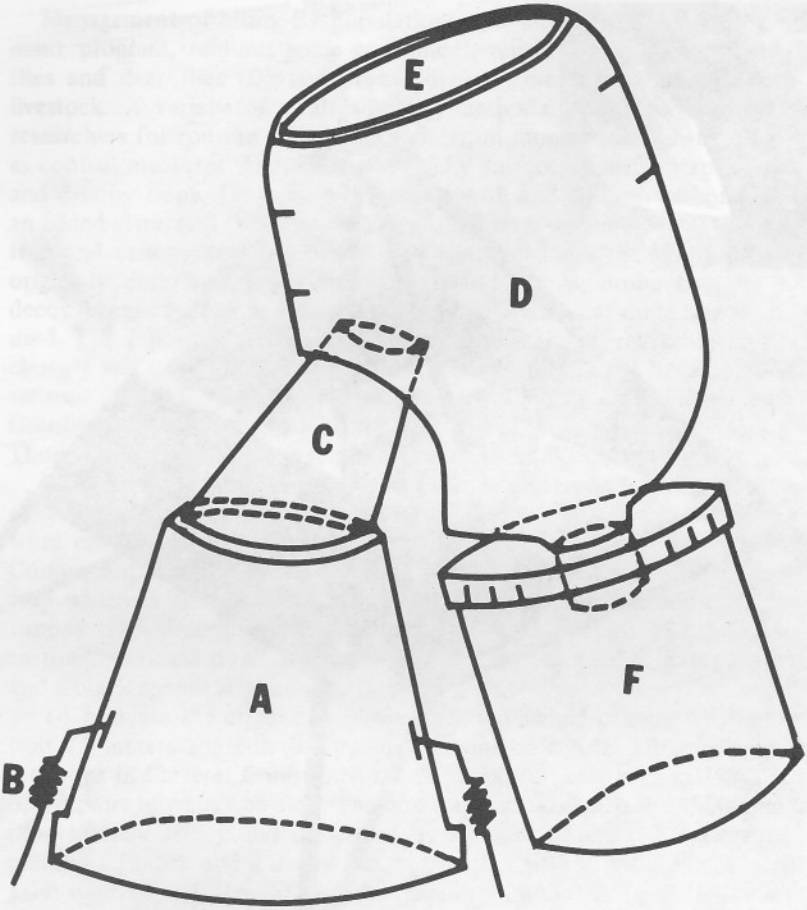

Fig. 2. Diagram of no-return assembly on top of rigid canopy trap. A = clear plastic 5-inch plant pot, B = spring to hold pot in place on trap, C = clear plastic cone, D = translucent plastic 1-gallon milk container, E = clear plastic cover fastened over cut-out end of container, F = container to hold trapped flies. A killing agent (dichlorvos, "No-Pest" strip) may be added to D or F. Parts are fastened with heat and appropriate epoxy glue.

assembled wooden frame. The trap can easily be assembled within 10-15 minutes in the field if the predrilled holes in the legs and braces are properly aligned with the metal brackets. The bottom of the canopy is about 5 ft square (1.52 m) and stands about 2 ft (30.5cm) above the ground. For greater stability, the ends of the legs may be fastened to stakes driven into the ground. After the trap is assembled, a black apron (18 inches wide) is painted

Table 1. Tabanidae collected by box trap and North Carolina rigid canopy trap (with ball) at 5 locations[1] in coastal salt marshes of Carteret County, N. C., April-October 1972.

Species[2]	Box Trap						N. C. Rigid Canopy Trap					
	A	B	C	D	E	Avg.	A	B	C	D	E	Avg.
C. atlanticus	53	2	15	2	3	15	338	11	27	5	35	83
C. brimleyi	0	2	*	1	*	1	47	73	*	50	*	57
C. fulginosus	13	0	0	67	*	20	188	133	33	1491	*	461
D. ferrugatus	70	42	17	*	6	34	40	273	9	*	17	85
Chl. crepuscularis	40	0	0	*	*	27	9	45	8	*	*	21
H. daeckei	6	0	3	11	*	5	84	229	39	128	*	120
H. hinei	*	20	0	*	*	10	*	541	63	*	*	302
H. lasiopthalmus	21	5	5	20	*	13	175	251	23	124	*	143
T. americanus	0	1	*	*	*	.5	16	22	*	*	*	14
T. atratus	6	0	2	*	0	2	5	10	9	*	7	8
T. fuscicostatas	70	8	*	*	24	34	30	27	*	*	2	20
T. gladiator	3	1	10	2	1	1	5	28	4	4	1	8
T. lineola	176	36	17	26	56	62	523	91	64	54	212	189
T. melanocerus	*	38	*	*	0	19	*	390	*	*	24	207
T. nigrovittatus	2153	875	583	5096	1184	1741	1563	669	404	3415	490	1308
T. petiolatus	0	6	*	*	10	5	32	25	*	*	7	21
T. pumulis	1	32	*	*	*	16	47	84	*	*	*	65
T. quinquevittatus	1006	84	38	*	443	390	605	19	57	*	226	227
T. sulcifrons	8	12	4	*	4	7	4	100	17	*	49	42

[1] Locations and number () of each type of trap: A, North River (1); B, Williston (1); C, Davis (3); D, Newport River (4); E, Otway (1

[2] *C. = Chrysops; D. = Diachlorus, Chl. = Chlorotabanus, H. = Hybomitra, T. = Tabanus.*

*Indicates that species either not collected or rare at the location.

onto the bottom of the plastic screen using high gloss exterior enamel paint.

Several of these traps have remained in the field for 2 years and withstood 60+ m.p.h. winds with no damage or need of repair except for repainting the black apron. Some deterioration of the plastic on the screen has been observed. Although the effectiveness is increased with the addition of a swinging sphere (inflated 16 inch diam. plastic beach ball painted black) as shown in Fig. 1, this trap will attract large numbers of flies without a sphere due to the contrasting black apron and shiny plastic-covered screen. The rigid trap is difficult to move and is designed for continuous operation in one position. It is being recommended for routine monitoring of tabanid populations in coastal areas.[2]

TRAP COLLECTIONS

Table 1 presents the species and numbers of Tabanidae collected during the 1972 fly season in coastal North Carolina. The rigid canopy trap (with ball) caught large numbers of *Tabanus nigrovittatus* Macq. and *T. quinquevittatus* Wied., but these collections were less than the numbers caught in the box trap. The rigid canopy trap collected larger numbers of other species than were collected by the box trap. A few incidental collections of other species are not included in Table 1.

Based on these data, the rigid canopy trap is superior to the box trap for population monitoring because it traps greater numbers of a variety of species. For trapping only *T. nigrovittatus* and closely related species, the box trap is superior to the rigid canopy trap.

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