TABANIDAE COLLECTED IN A MALAISE TRAP BAITED WITH CO_2 [1, 2]

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The efficacy of carbon dioxide (CO_2) as an attractant for Tabanidae was reported by Wilson *et al.* (1966) and DeFoliart and Morris (1967). Later Wilson (1968) found that sticky traps baited with CO_2 reduced the number of tabanids observed on cattle. Also, Olkowski and Anderson (1967) collected many more tabanids when Malaise traps were baited with CO_2. They estimated that the amount of gas evolved was about 2,000 ml/min based on the amount of dry ice used in a 24-hour period. However, the amount of CO_2 evolved in this way at any one time is not easy to determine because the sublimation into the gas depends on such factors as the ambient temperature and the amount of insulation provided by the container in which the dry ice is held. Therefore, in 1968, a study of the attractiveness of CO_2 was conducted to determine the effect of the release of controlled amounts of CO_2 from tanks on the number and species of tabanids collected.

MATERIALS AND METHODS. One Malaise trap (described by Townes, 1962) was used to evaluate attractiveness of 5 rates of release of CO_2 over a 24-hr collection period. The CO_2 was released from a 50-lb tank by a P-200 Multi-Seat® regulator and was adjusted to the required rate with a Gilmont® compact flowmeter placed about 2 feet above ground level on the center pole of the trap. The 5 rates of flow, 100, 500, 1,000, 1,500 or 2,000 ml of CO_2/min (random order) were replicated 4 times over about 7 weeks. Tests were begun at 9 a.m. (when the previous day's catch was collected) with CO_2 on Monday, Wednesday, and Friday of each week and without CO_2 on Tuesday, Thursday, and Saturday of each week. The collection started at 9 a.m. Saturday was allowed to accumulate until 9 a.m. Monday. This 48-hr collection was arbitrarily divided in half and considered as two 24-hr collections for computations. Thus, a total of 27 tests were made without CO_2.

The site of the test was a cleared strip about 30 feet wide and 0.2 mile long within the Delta Experimental Forest of the Delta Branch Experiment Station. The strip was oriented on a north-south axis with a red gum and cottonwood plantation on the west side, and the trap was located about 10 feet from the edge of the forest at about the midlength of the strip.

RESULTS AND DISCUSSION. Thirteen species of tabanids were collected (Table 1). An average of 31 flies/collection were taken when the trap was unbaited. When CO_2 was released at a rate of 100 ml/min, the average number collected was 5 times (and at 500, 1,000, and 1,500 ml/min, 8 times) the average number collected without CO_2. When CO_2 was used at a rate of 2,000 ml/min, the average number collected was 10 times the number collected without CO_2.

The number of flies collected at each rate for each replicate is shown in Table 2. Because of the wide range in numbers collected, the analysis of variance was not significant for rates of CO_2, but was significant for replications. No statistical analysis was made for numbers collected with and without CO_2 since the data were obviously significant.

[1] In cooperation with the Delta Branch of the Mississippi State University Agricultural Experiment Station, State College, Mississippi 39762.

[2] Mention of a proprietary product in this paper does not constitute an endorsement of this product by the USDA.

TABLE 1.—Tabanids collected in a Malaise trap baited with CO_2 (July 23–September 7).

	No. of tabanids collected in trap baited with indicated rates of CO_2 (ml/min)					
	0	100	500	1000	1500	2000
Tabanus						
abdominalis F.	101	157	277	109	223	129
americanus Forster	0	0	0	0	1	1
atratus F.	0	0	0	1	0	0
calens L.	2	5	6	18	9	22
fuscicostatus Hine	30	47	36	58	60	46
lineola F.	50	37	67	69	69	70
mularis Stone	23	0	2	1	1	0
proximus Walker	100	53	104	70	89	106
subsimilis Bellardi	419	192	274	509	464	438
sulcifrons Macquart	49	43	78	140	56	186
Chlorotabanus						
crepuscularis (Bequaert)	0	1	6	4	2	0
Chrysops						
flavidus Wiedemann	54	90	180	102	97	246
Leucotabanus						
annulatus (Say)	3	1	1	0	1	0
Total	831	626	1031	1081	1072	1244
Average	31	156	258	270	268	311
No. of collections	27	4	4	4	4	4

The use of only one trap in the study introduced several factors that prevented a critical analysis of the attraction of levels of CO_2 to numbers and species. Thus, in addition to such obvious influences as temperature and precipitation, the seasonal fluctuations in species collected during the 7 weeks of the study also influenced the numbers collected. However, when a comparison was made between the greatest number collected at each level of CO_2—375, 475, 483, 609, and 650 for 100, 500, 1,000, 1,500 and 2,000 ml/min, respectively, it appears that a linear relationship might exist. Such a correlation would indicate that CO_2 is probably used by tabanids in host finding. Additional studies are planned to determine the least amount of CO_2 needed to attract tabanids and the upper limit, if one exists, since CO_2 might have a repellent effect at high levels.

TABLE 2.—Number of tabanids collected at each rate of CO_2 in each replicate (July 23–September 7).

Rate of release of CO_2 (ml/min)	No. tabanids collected in indicated replicate				Total
	1	2	3	4	
100	375	98	66	87	626
500	400	475	27	129	1031
1000	249	483	162	187	1081
1500	609	417	24	22	1072
2000	168	650	166	260	1244

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