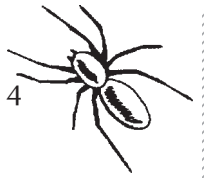


Designing a Control Strategy that Works: Questions from the Discussion

Based on the class discussion and the information provided below, answer the following questions:

- 1) Discuss the importance of each of the following characteristics of the Argentine ant to the design of a strategy to control or eradicate the ant:
 - a. Argentine ant queens are unable to fly. They mate in the nest where they were born, and if they are leaving to establish new nests of their own they walk short distances away. So Argentine ant populations expand slowly outward. Most other ant species have winged queens that may fly long distances away from their birth nests to establish new nests of their own.
 - b. Like most other ant species, the Argentine ant shares food through “trophallaxis.” In this process, worker ants pass regurgitated food to other workers, the brood (larvae and pupae), and the queens. Highly attractive food gets passed quickly throughout the nest.



- c. The Argentine ant forms large “unicolonies” in which it is difficult to distinguish among nests. In the park, each of the two ant populations is essentially one big colony. The Argentine ants from one nest do not defend their territory against Argentine ants from another nest. In fact, worker ants move readily from nest to nest, helping out wherever they are needed.

- 2) In the summer of 1996, researchers conducted a study in which they measured the effect of treating segments of the ant population borders with toxic bait. One of the two study areas they chose was located on the “crater” floor, on the rapidly expanding eastern edge of the ant population. One reason the researchers cited for choosing this site was that they wanted to keep the ants away from the Hōlua campground and cabin, less than 500 meters (1640 feet) away from the boundary of the ant population.

Drawing on what you have learned about the characteristics of Argentine ants, explain why researchers would be concerned about keeping the ants away from the campground and cabin area.



- 3) In August 1997, a helicopter was used to apply toxic bait to the expanding border areas of both Argentine ant populations. The entire upper population border was treated, as well as the southwest edge of the lower population border. Researchers monitored the expansion of the ant population at 84 stations along these borders.

They divided the upper study area and monitoring stations into two portions because they have different historic rates of expansion:

- The “front country” or western part, where the historic rate of expansion is slower.
- The “crater” or eastern part, where the population has historically spread more rapidly.

One year after the treatment, researchers gathered the data contained in Table #1: August 1998 Ant Border Monitoring Results, August 1997-August 1998 (page 5 of this handout). Use those data to answer the following questions, writing the formulas and each step of your calculations in the spaces below the questions. Round to the nearest one-tenth:

Mean boundary expansion = Total expansion (T)/Number of stations recording data (n)

- a. What is the mean boundary expansion for the lower population?

- b. What is the mean boundary expansion for the frontcountry segment of the upper population?

- c. What is the mean boundary expansion for the “crater” segment of the upper population?

- d. What is the mean boundary expansion for the entire upper population?



4) Fill in the table below, using the results of your calculations. Then answer the question that follows.

	Mean boundary expansion one year after treatment (m/yr)	Mean boundary expansion in previous years (m/yr)
Lower population	_____ (n = _____)	29 (1982-97 data)
Upper population	_____ (n = _____)	
Frontcountry segment	_____ (n = _____)	24 (1993-97 data)
"Crater" segment	_____ (n = _____)	81 (1993-97 data)

Question

Based on the data in the table above, would you say that the effort to control the spread of the Argentine ant is working or not working? Explain your reasoning.



**Table #1: August 1998 Ant Border Monitoring Results
August 1997-August 1998 (One Year)**

Lower Population		Upper Population Frontcountry Segment		Upper Population "Crater" Segment	
Station #	Expansion (m)	Station #	Expansion (m)	Station #	Expansion (m)
1	0	44	0	38	12
2	0	45	0	39	0
3	10	46	0	40	10
4	0	47	0	41	35
5	0	48	0	42	21
6	0	49	5	43	2
7	0	50	0		
8	0	51	0	65	0
9	0	52	0	66	0
10	0	53	0	67	0
11	0	54	0	68	15
12	0	55	18	69	0
13	0	56	0	70	0
14	0	57	0	71	0
15	0	58	0	72	0
16	0	59	0	73	8
17	0	60	0	74	0
18	0	61	0	75	18
19	0	62	0	76	31
20	0	63	0	77	no data
21	0	64	0	78	0
22	0			79	no data
23	0			80	no data
24	0			81	156
25	0			82	74
26	0			83	49
27	0			84	51
28	0				
29	0				
30	0				
31	0				
32	0				
33	12				
34	16				
35	0				
36	0				
37	0				