

Acceptance and Efficacy of Beuvaria bassiana Formulations to Laboratory Colonies of the Red Imported Fire Ant (Hymenoptera: Formicidae)

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The fungus, Beuvaria bassiana, has been shown to be parasitic on the red imported fire ant (Solenopsis invicta, Buren) under both laboratory and field conditions. A major drawback of the fungus as an effective control measure for fire ants has been the difficulty of applying viable fungus to ant mounds in the field and ensuring that it reaches enough workers and brood to eliminate or reduce ant numbers within the mound. The Feromone Corporation supplied a sample of B. bassiana impregnated on an easily applied granular formulation. A series of trials were conducted to determine if this formulation of the fungus would be fatal to fire ants in laboratory colonies.

Materials and Methods

Mortality trial. On 4 September 1991, eight fire ant colonies, contained in Fluon[®]-coated plastic boxes, were rated. The estimated number of ants, amount of brood and relative number of queens (or alates) was recorded for each colony. One-quarter teaspoon (0.80 grams) of the Feromone B. bassiana fungus-impregnated granules was scattered inside each of four ant colony dishes. The remaining four colonies were maintained as untreated controls. Colonies were maintained on a standard dietary regime consisting of frozen crickets, honey-water and water and rated at 24 hours and 6 days following treatment. At this time, an additional one-quarter teaspoon of granules was added to the colony dishes, but this time the material was watered in with approximately 10 ml. of distilled water. The colonies were maintained for an additional three weeks and rated periodically.

Preference trial. Six fresh, actively feeding laboratory colonies were used. Three small, plastic weighing dishes were placed in each colony. Each dish received one gram of one of the following: B. bassiana fungus-impregnated granules, Konsume[®] feeding stimulant, or fungus impregnated granules plus 2 percent Konsume. The dishes were left in the colonies overnight before the material was removed and the amount remaining recorded.

Results and Discussion

Mortality trial. Within 24 hours, the ants had removed the B. bassiana fungus-impregnated granules from the colony dish or formed it into a pile within the dish. By the end of one week no mortality was noted in either worker ants, brood or queens. The dry material that was sprinkled into the colony dishes appeared to have no effect on ant mortality and was simply removed from the dishes. With the application of water to the second granule treatment the ants were observed to be avoiding the dishes and/or areas with granules. They were unable to move the granules out of the colony dishes because they lacked structure. Results (Table 1 and 2) indicate that,

compared to untreated fire ant colonies, the B. bassiana treatments caused little mortality to worker ants, brood, or queens. There was, however, a numerical decline in estimated ant numbers and brood 12 days following treatment.

Preference trial. The preference test given to both the fungus-impregnated granules and the feeding stimulant indicated that the ants were not repelled by these materials, though they were not attracted by them either. No material was seen to be removed from the colonies and the experiment was discontinued after 24 hours.

Conversations with the manufacturer's representative indicated that the material that was supplied may not have contained viable fungus. Given the history of Beuvaria bassiana as a parasite of fire ants, these results would tend to support this conclusion

Table 1. Mean estimated red imported fire ant colony size following treatment twice with *Beauveria bassiana* fungus-impregnated granules or left untreated.

Number of ants X 1000 ± S.D.					
<u>Colony</u>	<u>Pre-count</u>	<u>24-hrs</u>	<u>6-days</u>	<u>12-days</u>	<u>21-days</u>
Treated 1-4	11.3 ± 4.4	11.3 ± 4.3	11.5 ± 4.0	6.0 ± 3.4	6.0 ± 3.4
Untreated 1-4	12.0 ± 5.4	12.0 ± 5.4	11.5 ± 5.7	10.3 ± 5.2	10.5 ± 5.1
<i>t</i> =	-0.2159	-0.2159	0.0000	-1.3744	-1.4796
<i>P</i> =	0.4181	0.4181	0.5000	0.1092	0.0947

Table 2. Red imported fire ant colony condition following treatment twice with *Beauveria bassiana* fungus-impregnated granules or left untreated.

Condition of brood/presence of queens					
<u>Colony</u>	<u>Pre-count</u>	<u>24-hrs</u>	<u>6-days</u>	<u>12-days</u>	<u>21-days</u>
Treated 1	- / ++	- / ++	- / ++	- / +	- / +
Treated 2	++ / ++	++ / ++	++ / ++	+ / ++	+ / ++
Treated 3	++ / ++	+ / +	+ / +	- / +	- / -
Treated 4	++ / ++	++ / ++	++ / ++	++ / ++	++ / ++
Percent:	75 / 100	75 / 100	75 / 100	50 / 100	50 / 75
Untreated 1	- / -	- / -	- / -	- / -	- / -
Untreated 2	++ / ++	++ / ++	++ / ++	++ / ++	++ / ++
Untreated 3	+ / +	+ / +	+ / +	++ / +	+ / +
Untreated 4	++ / ++	++ / ++	++ / ++	++ / ++	++ / ++
Percent:	75 / 75	75 / 75	75 / 75	75 / 75	75 / 75