

Abstract: Annual Fire Ant Conference, May 1992, San Juan, Puerto Rico

Individual and colony Level Fire Ant Variation in Responsiveness

Robert K. Vander Meer

Research into fire ant homing orientation cues led to the testing of many fire ant colonies for their ability to find their way back to their nest and recruit workers to a food source. The data was derived from colonies reared in the laboratory from newly mated queens, thus there was no competitive pressure on these colonies. The data ranged from a low of 2 minutes to a high of 21 minutes. The within colony variation was small compared to the colony to colony variation. The question arises of whether or not colonies very slow to recruit to food would be at a competitive disadvantage in the natural setting. In fact, they may not survive. Field studies are planned to test this hypothesis. These data illustrate that not all colonies are created equal.

If we look within the colony there are three defined age related worker castes (temporal castes). Starting with newly eclosed workers, there are nurse or brood tending workers, then reserves who would normally maintain the colony structure, and foraging workers, who find food and recruit other workers to it if necessary. Foraging workers are often called the expendable caste because they are close to death. Anecdotal observations had been made indicating that foraging workers were not very sensitive to the queen pheromone. One hypothesis was that workers are most responsive to the pheromone systems they are currently experiencing. Thus brood tending workers are predicted to be most sensitive to brood and queen, whereas foraging workers are expected to be most sensitive to recruitment pheromones. We tested these hypotheses by studying the responsiveness of the temporal castes in three bioassays. Of the three temporal castes, brood tending workers were the most responsive to brood placed in their immediate vicinity. Foraging workers were significantly slower to respond. The same was true for a bioassay that measured the attraction and aggregation of the ants to a source of the queen pheromone. Thus, these two results support the hypothesis. Unexpectedly, similar results were obtained for olfactometer bioassays with the recruitment pheromone. The foraging workers were expected to respond better than their brood tending counterparts. Therefore our working hypothesis had to be modified as follows: as worker ants age

their sensitivity to outside stimuli generally decreases as a result of senescence (old age). The moral of this story is that all workers within a colony are not created equal.

How will these observations affect our theories on the use of pheromones to enhance baits? Not much. After all, we are targeting the pheromone enhanced baits toward foraging workers! The situation is not unlike aging humans, who after a time require glasses, hearing aids, need to add more spices, etc. to clarify or intensify various stimuli.

Concentration / activity studies with the three fire ant temporal castes have demonstrated that foraging workers respond very well to elevated quantities of pheromones. In baits, we may simply need a little more stimulus to effect the desired behaviors in foraging workers, but the end result will be the same.