Adoption of Newly Mated Queens: What are the consequences for Control?

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Abstract:

We previously demonstrated that territorial and highly aggressive fire ant workers become non-aggressive toward conspecific workers and newly mated queens (NMQs) soon after the loss of the colony queen. The decrease in aggressivity leads to requeening of the colony through adoption of NMQs. Here we attempt to answer the question - how does the adoption of NMQs relate to the control of fire ants?

The formation of queenless worker groups in the field can occur in many ways. For example, the colony queen can die from (A) natural causes, (B) mechanical disturbances, (C) chemical treatment of soil, and/or (D) bait insecticide treatment. Isolated polygyne colonies exhibit heightened conspecific aggression, similar to that found for monogyne colonies. For this reason we hypothesize that isolated polygyne colonies will have a low probability to develop into a polygyne population. If multiple NMQs were adopted by queenless worker groups from situations A or B above, they would likely lead to an isolated polygyne colony and not a polygyne population. Situations C and D have the potential to create population-wide queenless worker groups and polygyne populations.

Bait formulated hydramethylnon was used for fire ant control throughout the 1980's to the present. The action of this insecticide is known to kill the queen but not all the workers. We demonstrated a correlation between the field treatments with hydramethylnon bait and the development of incipient polygyne populations. But this represents a worst case scenario where attempts to control a monogyne population results in development of a polygyne population. Treatment produced queenless worker groups may never have the opportunity to adopt NMQs or ultimately adopt only a single queen yielding a new monogyne colony. Newly mated queen adoption, regardless of the monogyne/polygyne end result will lead to faster than expected reinfestation. The usual explanation for reinfestation of treated field sites is that colonies on the edge of the treated area move in to fill the void and/or NMQs reinfest treated areas. We want to add the adoption of NMQs by queenless worker groups as another option to consider when explaining reinfestation. Future research will define the effects of Fenoxycarb, Avermectin, and the presence or absence of alates on newly mated queen adoption.