

## INTRODUCTION

Current attract-and-kill techniques for controlling Lepidopteran (moth) pests often combine an attractant—such as a sex pheromone—with a contact insecticide in a paste or a gel form. A major problem with these formulations is that moths have to contact a very small surface long enough to pick up lethal dose while contacting their sex pheromones at the same time. However, exposure of sex pheromone by direct contact increases the risk of moths overloading their sensory system, resulting in their leaving the pheromone source immediately. Therefore contact time is a critical factor affecting success of attract-and-kill techniques. Our objective is the development of an attract-and-kill device where sex pheromones and a insecticide were incorporated separately for Oriental fruit moth, a key pest of peach, pear, and apple. This potential device would reduce not only current pesticide usage, but also pesticide residue on the fruits.

## MATERIALS AND METHODS

### What is the minimum contact time required for knockdown?

- A small fabric pouch was impregnated with deltamethrin (0.2g/cm<sup>2</sup>). Ten of 2-3 d old OFM males were placed as a group of two, confined by a petri dish, onto treated or control pouches for 5, 10, 15, 30 and 60 s
- After exposure, males were kept in solo cups (4 oz). Moth mortality and “knockdown” (leg twitching, leg automation or inability of flying) were assessed 2 h later

### Is deltamethrin repellent to OFM?

- The attract-and-kill device consisted of a small fabric pouch impregnated with deltamethrin and a 0.1 mg OFM lure. In a wind tunnel (Fig. 1), groups of 2-3 d old males were presented with this device or a control pouch lacking deltamethrin and their responses compared
- Behavior recorded: wing fanning; non-anemotactic flight from the release cage (fly out); anemotactic flight in the pheromone plume without touching the pouch (upwind); upwind anemotactic flight followed by landing on the pouch (on the source), duration of contact with the pouch, and non-response

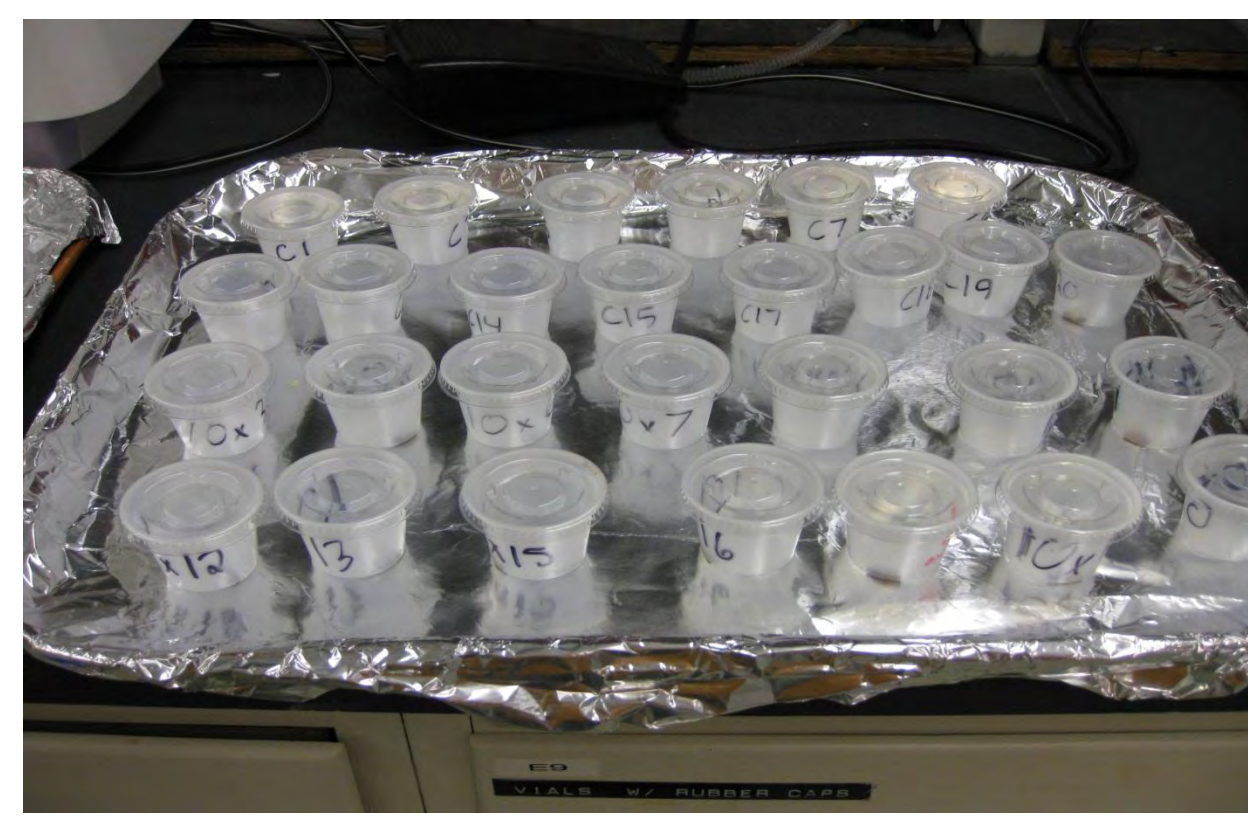


Figure 1: Wind tunnel (1.3 × 0.8 m in cross-section and 2.4 m long)

Figure 2: Diet cups containing OFM after deltamethrin exposure

### Does attract-and-kill device kill OFM?

- Males that contacted the device in the wind tunnel were re-captured into diet cups and the numbers of knockdown or dead males were recorded 1 and 24 h later.
- For those males which contacted device, duration of their contact was also monitored.

## RESULTS (given as figures)

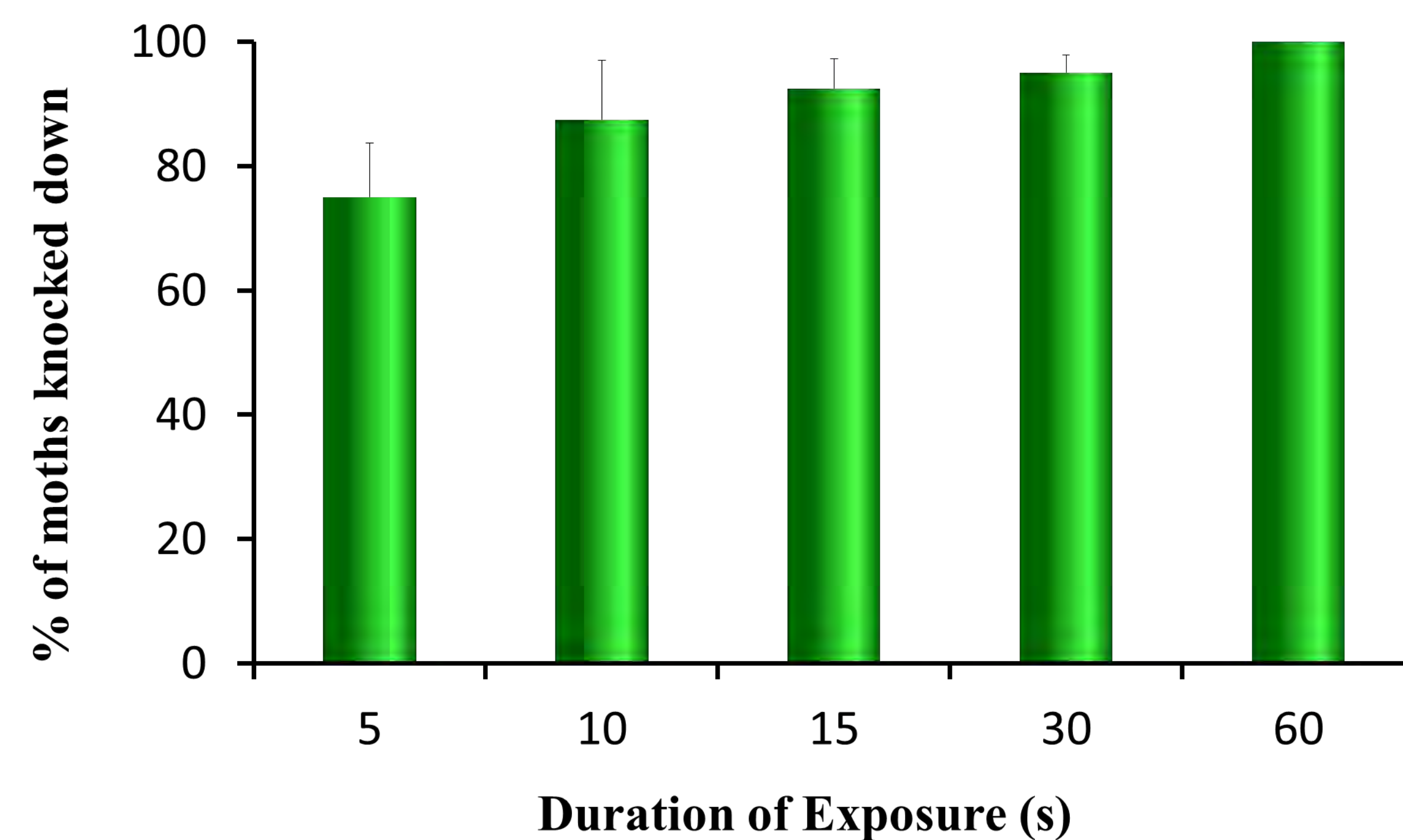


Figure 3. Mean percentage of OFM males were knocked down 2 h after contacted with deltamethrin treated surface.

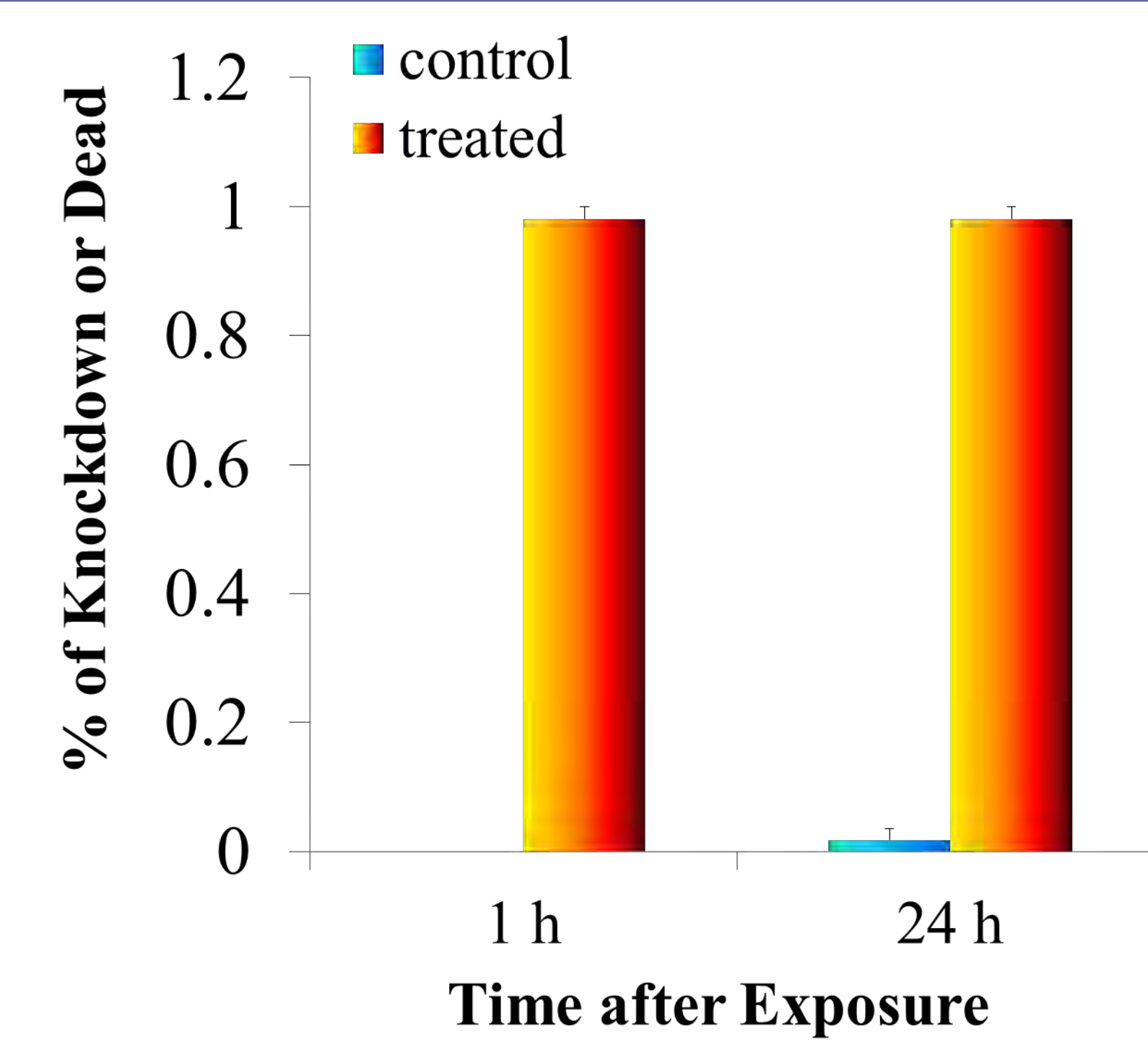


Figure 5. Mean percentage of OFM males knockdown or dead after voluntarily exposure to deltamethrin in the wind tunnel

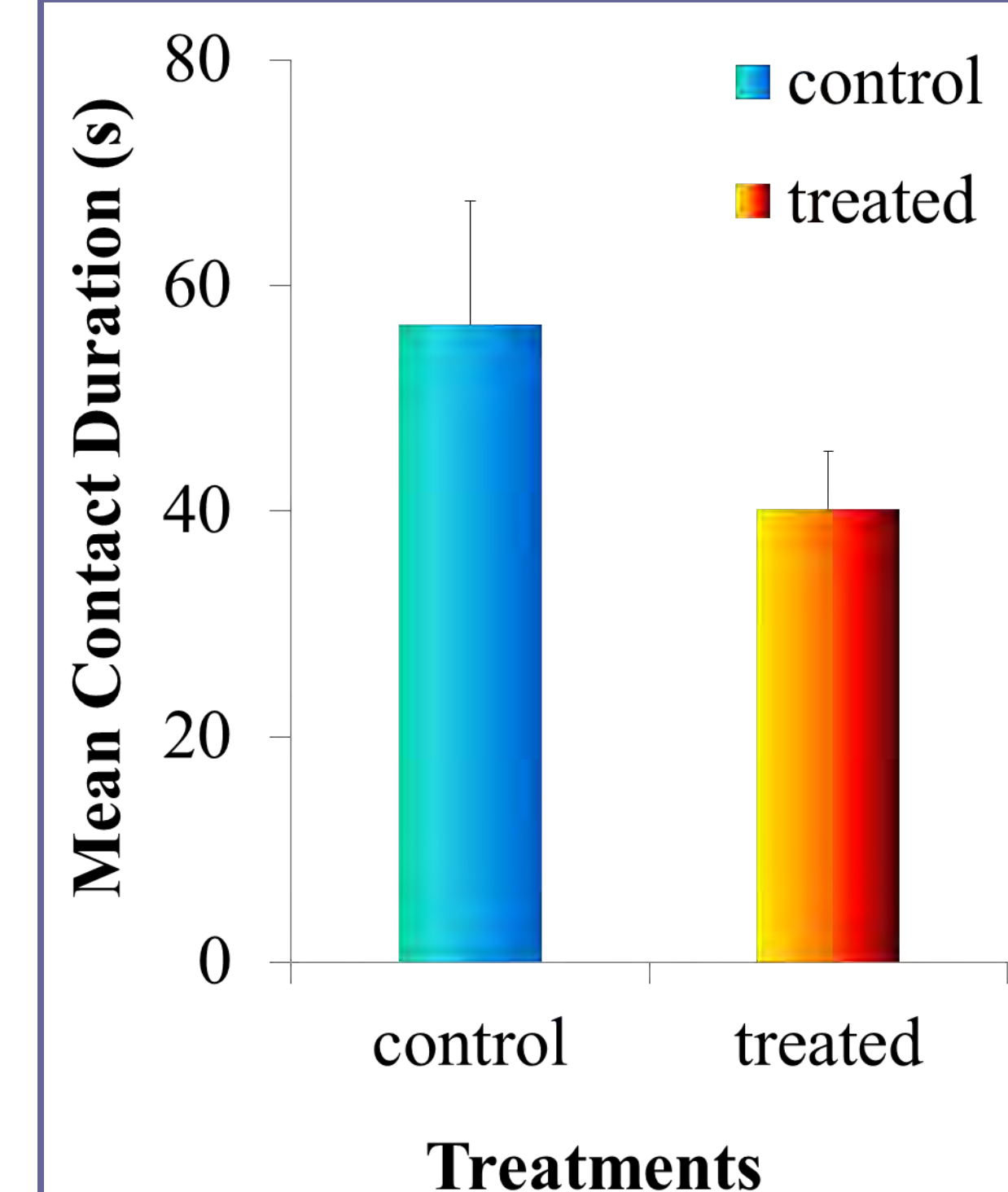


Figure 6. Mean duration of contact time by OFM males on pouches in the wind tunnel

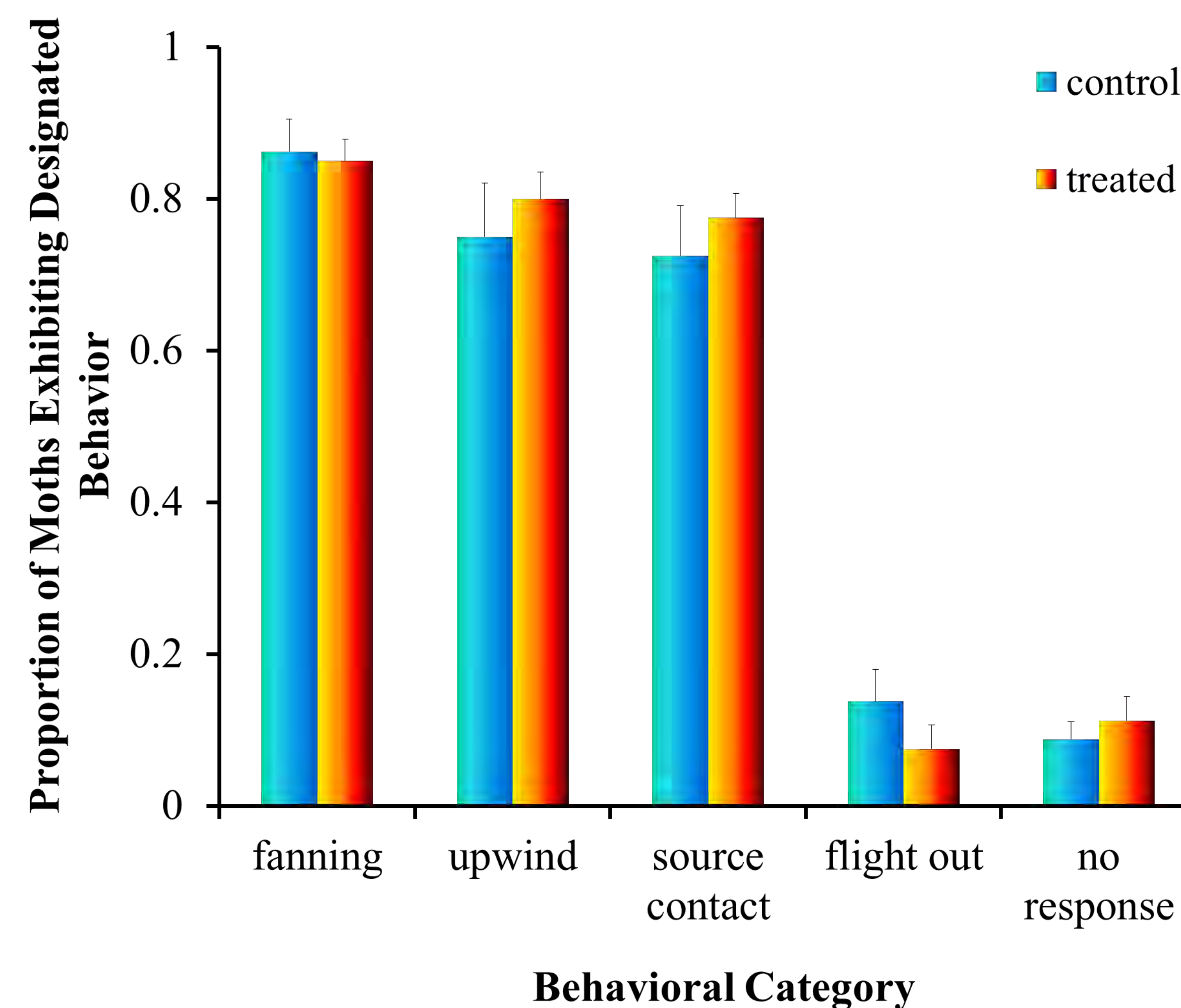


Figure 4. Male OFM behaviors in response to control and deltamethrin treated pouch baited with 0.1 mg lure

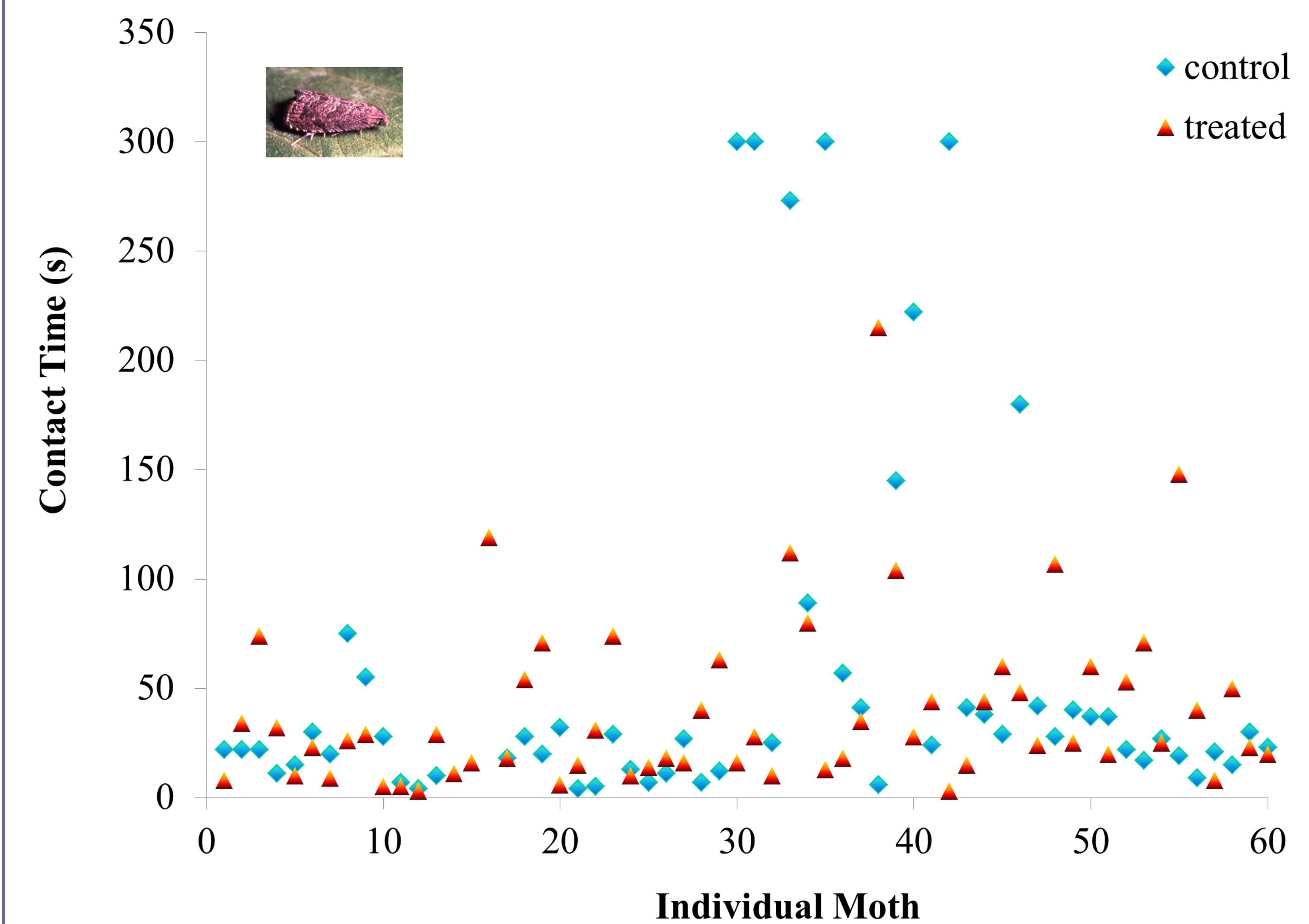


Figure 7. Duration of contact time by individual OFM males after reaching to control or treated surface in the wind tunnel.

## CONCLUSIONS

- OFM required at least 15 s of contact with deltamethrin in order to reach >90% knockdown and increased contact times increase the chance of mortality (Fig. 3)
- Deltamethrin was not repellent to OFM mate finding at tested rates (Fig. 4)
- Nearly all the males contacted deltamethrin treated surface either knockdown or dead 1 h after exposure (Fig. 5)
- Males spend similar amount of time searching on control vs. treated surface (Figs 6,7). This further supports the hypothesis that OFM are not repelled by deltamethrin
- Attract and kill appears feasible for OFM. In 2012 we will begin testing prototype devices in the field.