

# Strength in numbers? Do European fire ants communicate & forage better in groups?

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## BACKGROUND:

- Ants communicate and forage by using smells that can be attractive or induce certain behaviors amongst the colony
- European fire ants (*Myrmica rubra*) are a significant invasive species in North America and disrupt native species and recreational areas
- By testing how European fire ants respond to these smells, we can gain a better understanding of their foraging behaviours

## METHODS

- Testing was conducted during summer 2020 (n=10) and summer 2021 (n=10)
- Individual ants and groups of 10-20 ants were collected from the same colony and tested in parallel
- Ran 3 treatments with Y-tube choice olfactory bioassays, shown in figure 1
  1. **Alarm pheromone** (3-octanol 3-octanone) (Cammearts-Tricot, M.C. 1973)
  2. **Trail pheromone** (3-ethyl-2,5-dimethylpyrazine) (Evershed R.P. et al. 1982)
  3. **Food bait** (apples & cockroaches)
- The proportion of ants responding to the treatment was recorded
- The number of non-responders (N.R.) was recorded

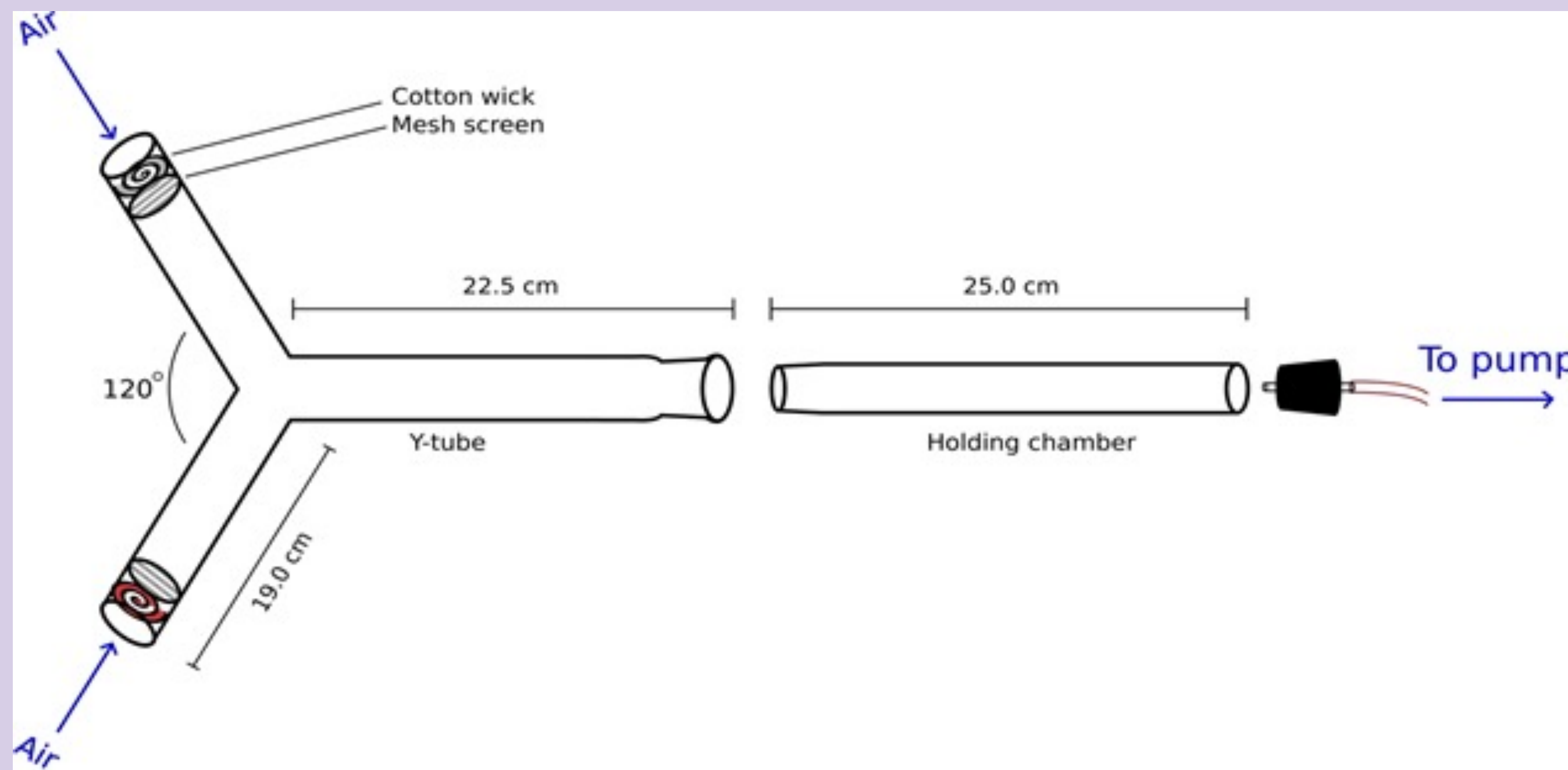


Figure 1 - modified Asim Renyard Diagram

# Myrmica rubra, also called the European fire ant, appear to communicate and forage better in groups rather than individually

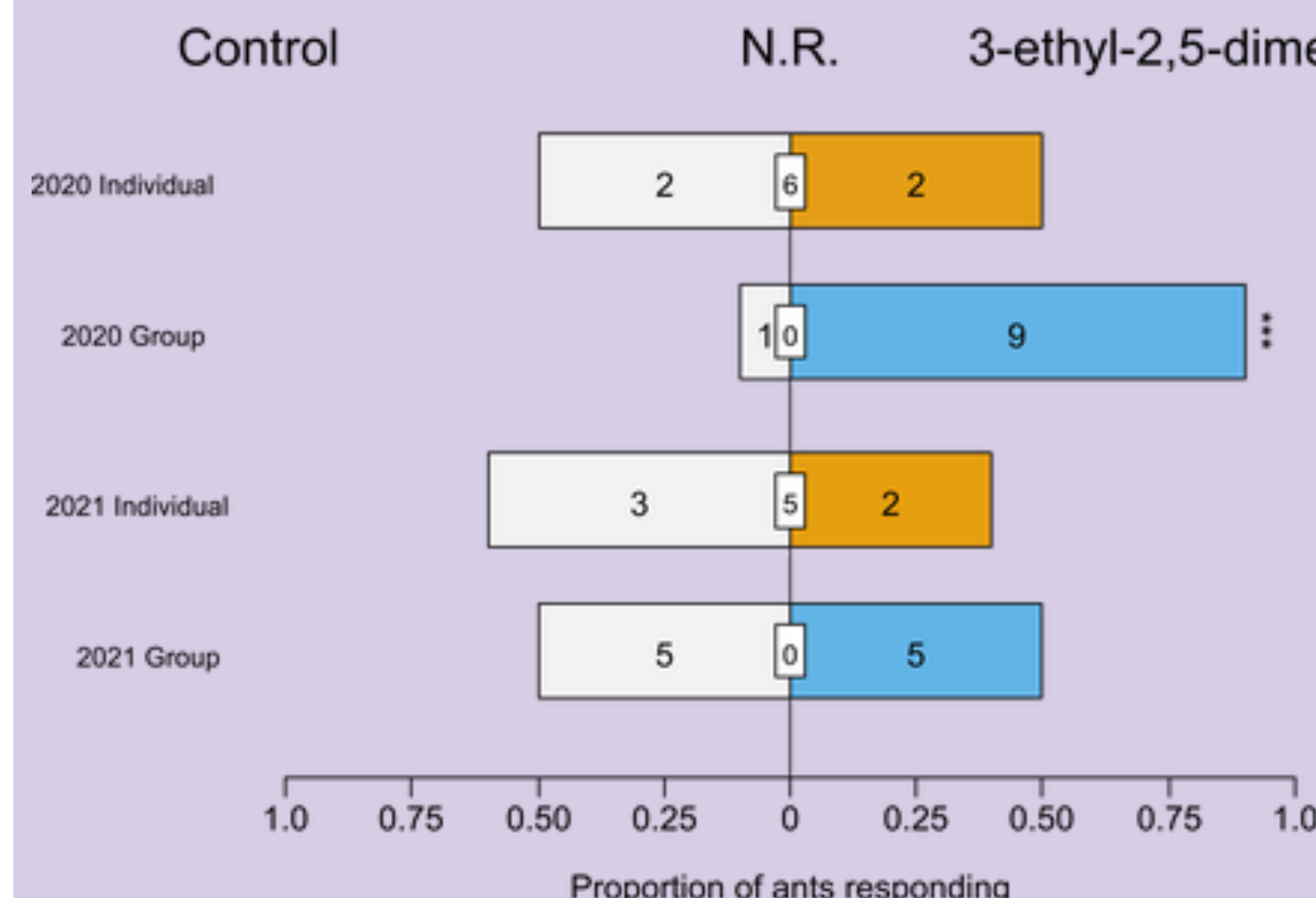


Figure 3: Trail pheromone replicates

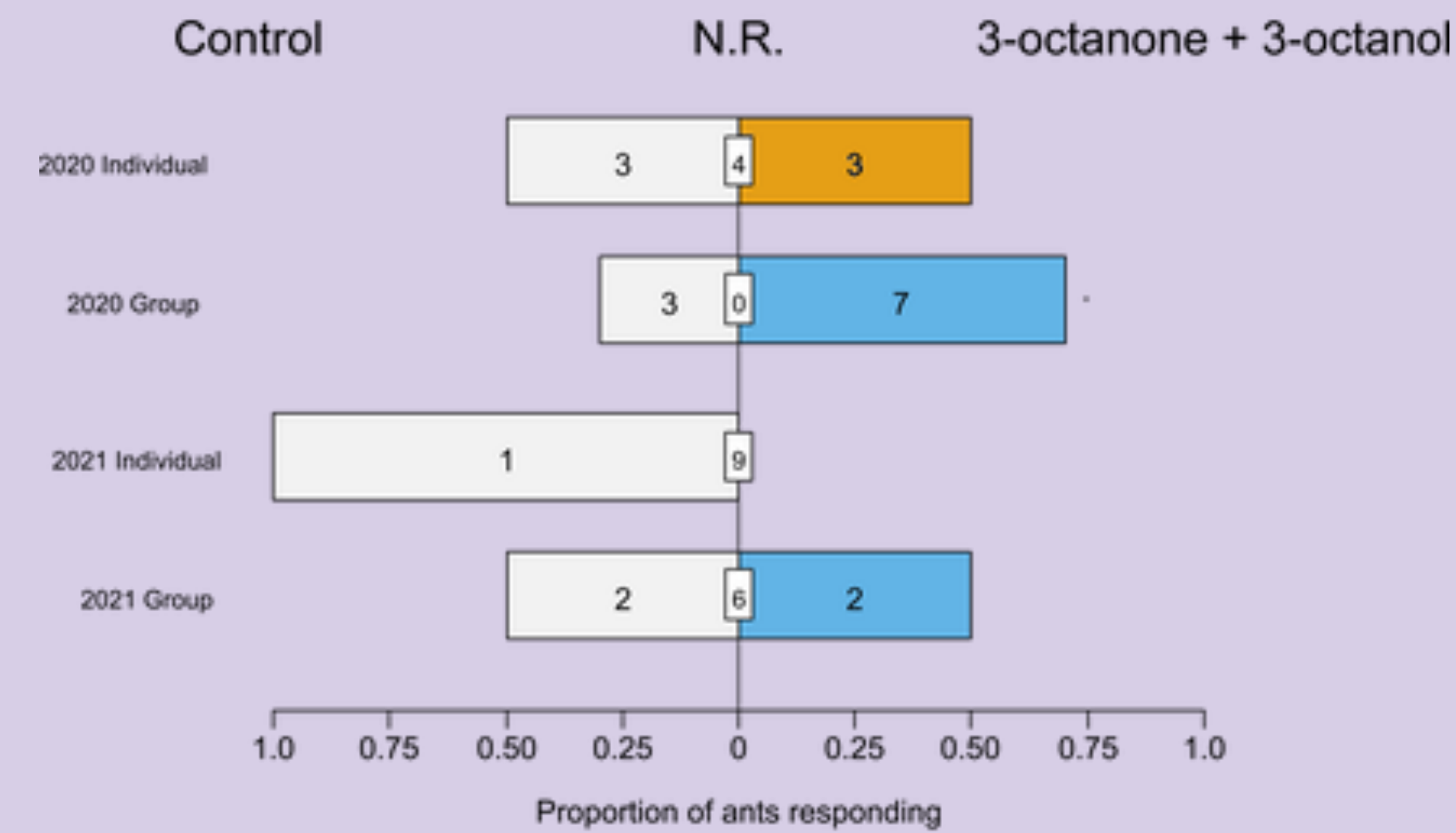


Figure 2: Alarm pheromone replicates

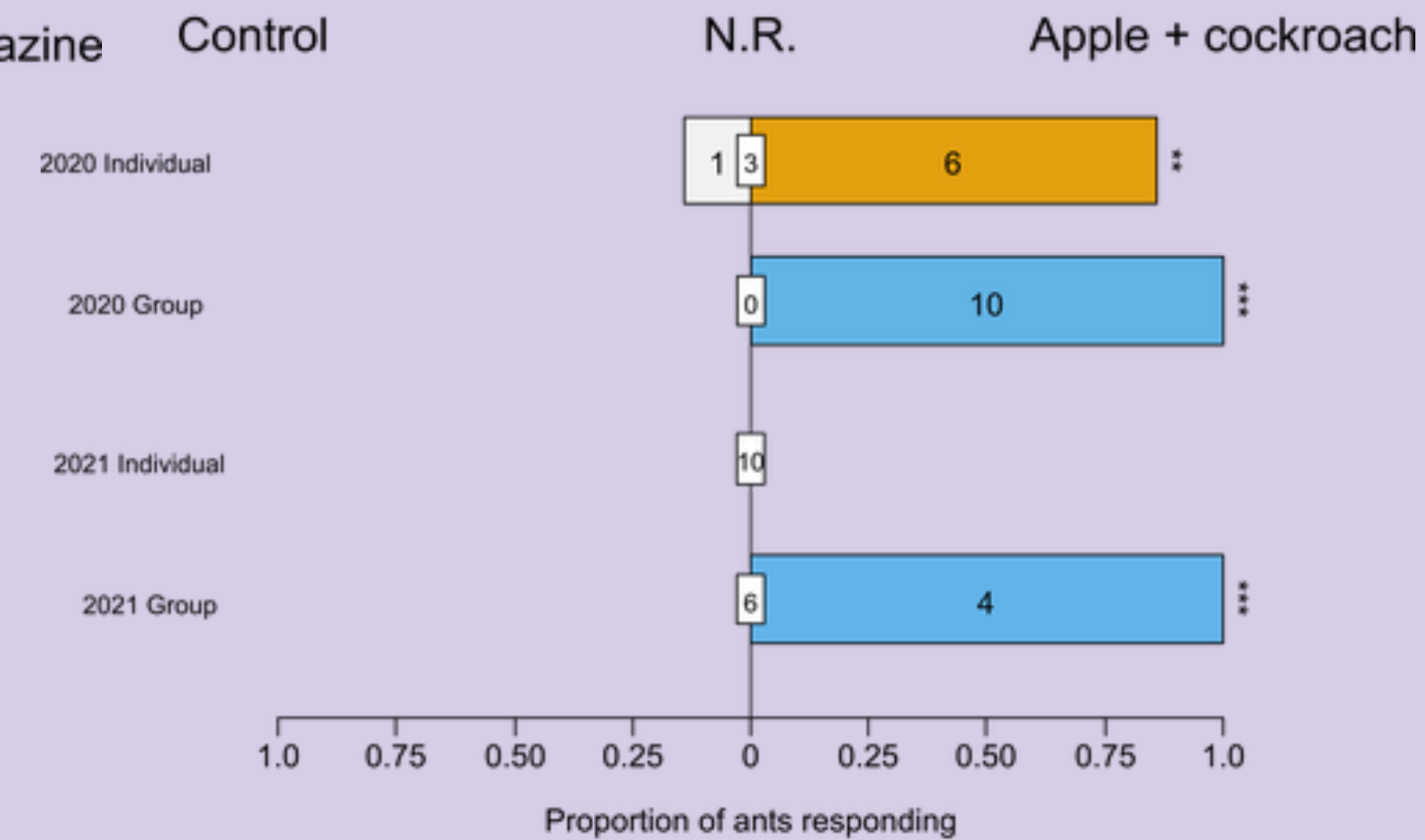


Figure 4: Food bait replicates

## RESULTS

- While not statistically significant, responses to the alarm pheromone showed that EFA may tend to respond better in groups (Figure 2: Alarm pheromone replicates)
- EFA group replicates showed a higher response rate for their trail pheromone (Figure 3: Trail pheromone replicates)
- EFA group replicates showed a strong attraction to the food bait (Figure 4: Food bait replicates)
- The results from the three treatments showed an overall trend that European fire ants tend to respond better in groups rather than individually

## DISCUSSION

- A better understanding of European fire ant foraging and communication behaviors can provide insight into development of pest management strategies
  - Pheromones and food cues can be used as attractants for the development of earth-friendly bait to target the invasive European fire ants
- The EFA did show an overall lower response rate during Summer 2021 compared to Summer 2020
  - The heatwaves that occurred over summer 2021 could be a possible explanation for the inconsistencies in data, as the high temperature could have affected the foraging behavior of European fire ants

## REFERENCES

Cammearts-Tricot, M. C. (1973). Pheromones Argéant les Ouvrières de *Myrmica Rubra*. *J. Insect Physiol.* 19(6),1299-1315. [https://doi.org/10.1016/0022-1910\(73\)90213-8](https://doi.org/10.1016/0022-1910(73)90213-8)

Evershed R.P. et al. (1982). 3-ethyl-2,5-dimethylpyrazine, the trail pheromone from the venom gland of eight species of *Myrmica* ants. *ScienceDirect*, 12(4), 383-391. [https://doi.org/10.1016/0020-1790\(82\)90035-X](https://doi.org/10.1016/0020-1790(82)90035-X)

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