

Danny Hanson (danny.hanson52@gmail.com), Stuart Wagenius
Chicago Botanic Garden

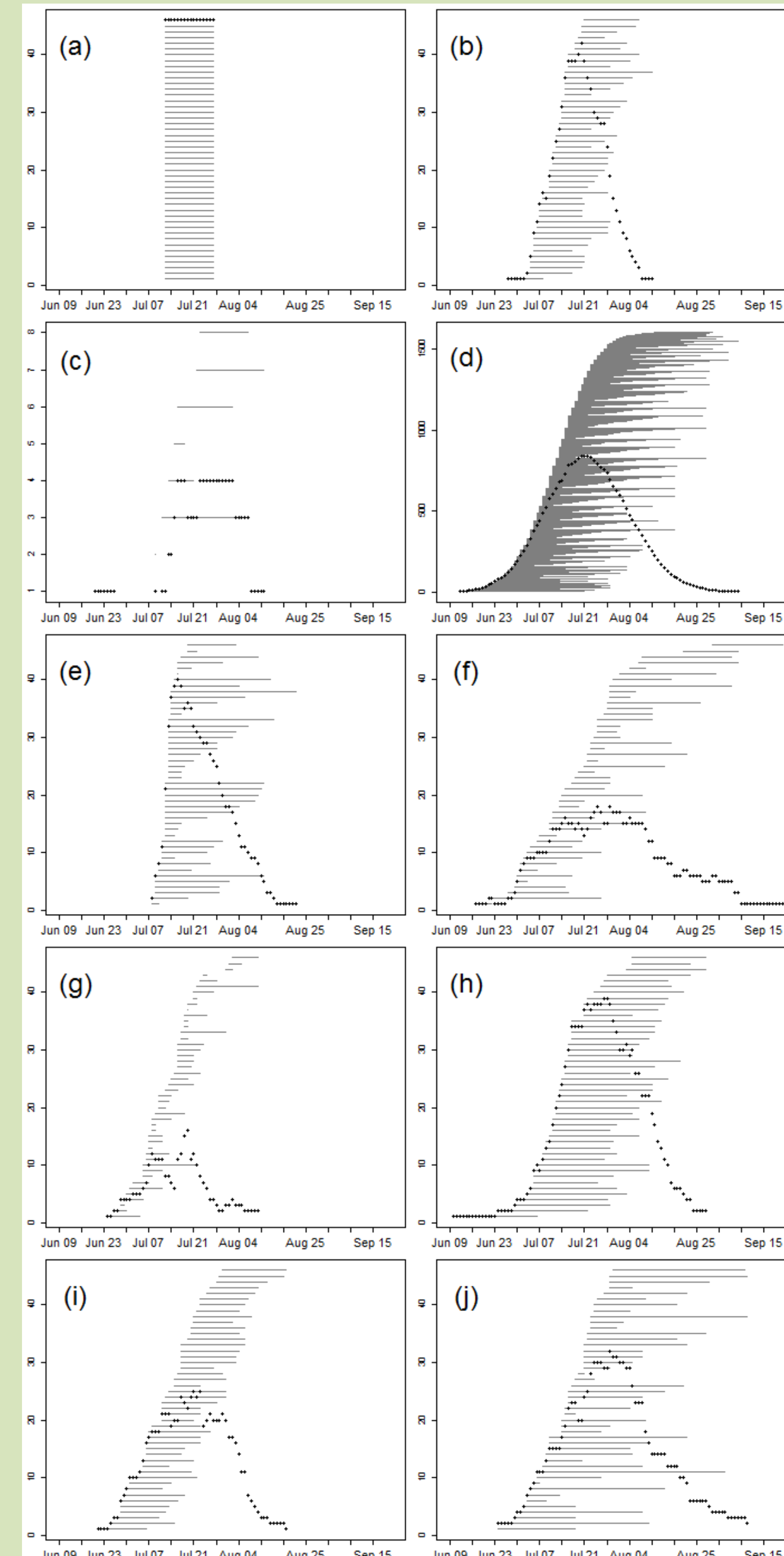
Introduction

- Mating synchrony, the amount of overlap in mating activity, is critical to reproductive success in many species.
- Individual variation in mating phenology can be characterized by three components: timing of initiation, duration of activity, and population size.
- Data on individuals enables us to make better predictions of mating opportunity.
- No consensus exists about which measures of synchrony to use in phenology research.
- Goals: (1) describe patterns of individual variation and how they affect synchrony and (2) describe the differences between the measures of synchrony

Methods

- Data from 27 populations of *Echinacea angustifolia*, the narrow-leaved purple coneflower, were used for input parameters:
 - standard deviation of start – 1 to 20 days
 - mean duration – 1 to 30 days
 - standard deviation of duration – 1 to 20 days
 - population size – 2 to 1646 individuals
- The timing of mating was simulated in 200,000 populations.
- We calculated 12 measures of synchrony for each mating schedule.

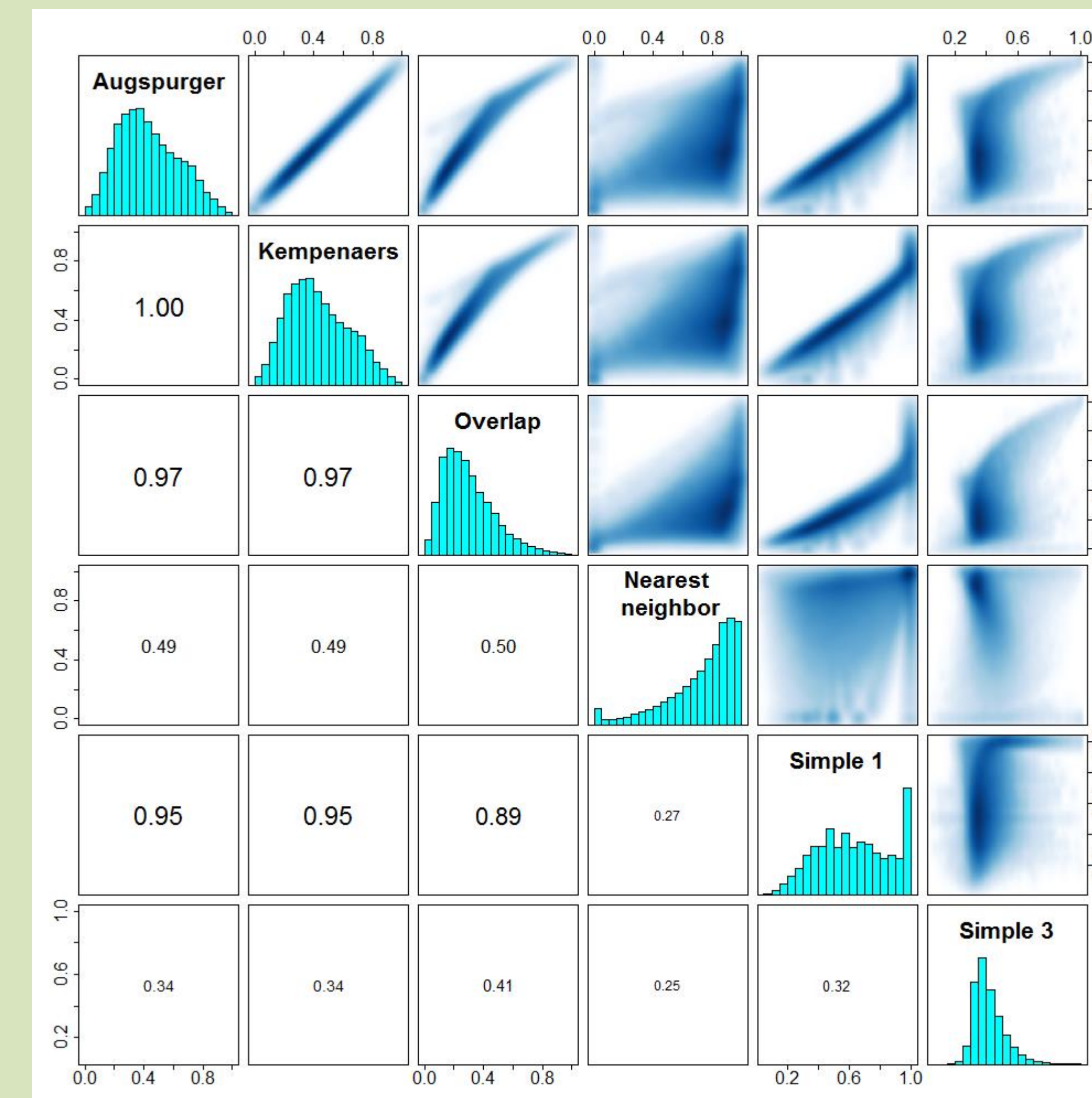
Mating schedules vary



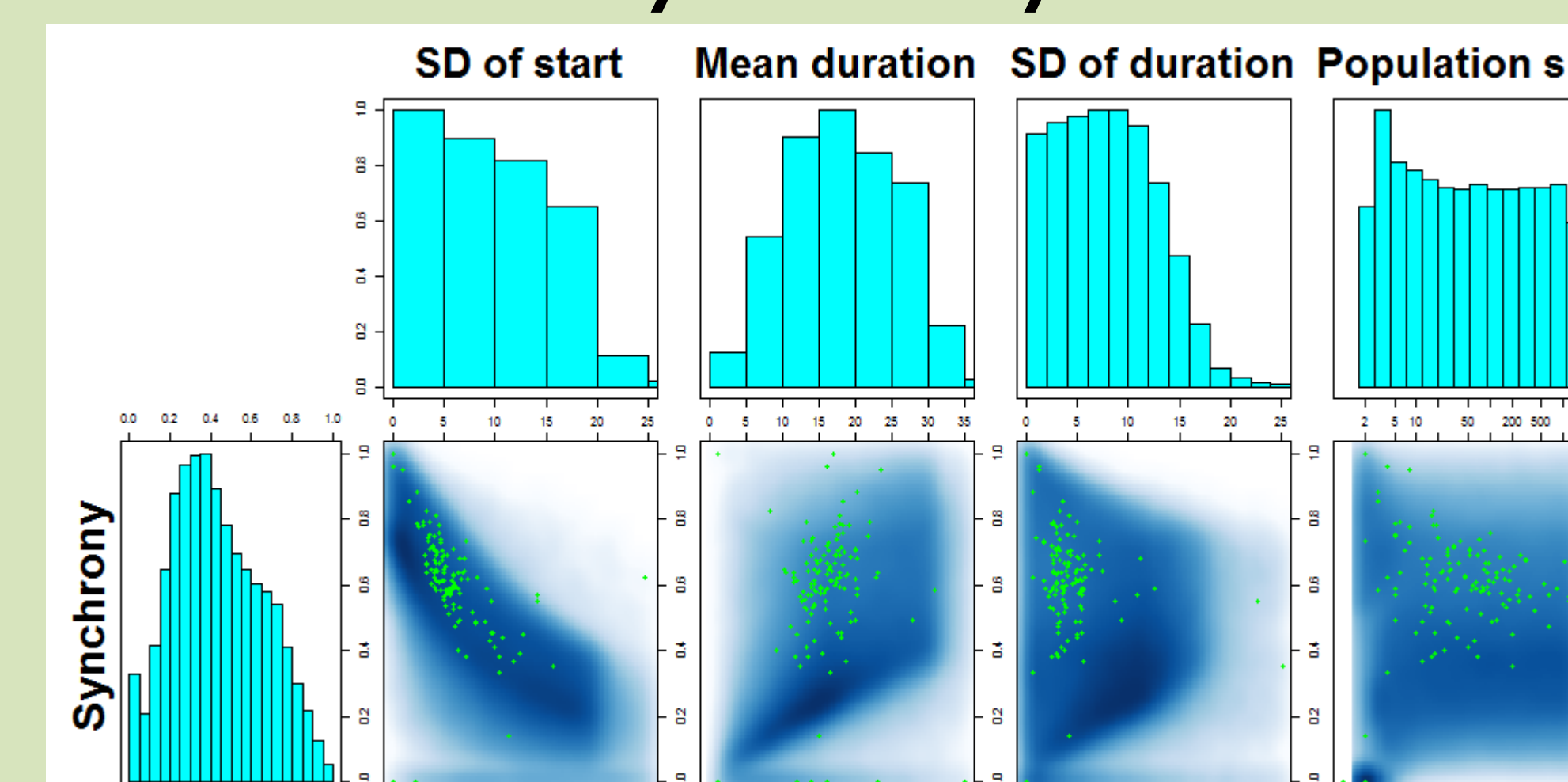
Variation type – calculated synchrony

(a) No variation – 1	(b) average variation – 0.62
(c) small population – 0.26	(d) large population – 0.37
(e) low standard deviation of start – 0.63	(f) high standard deviation of start – 0.25
(g) low mean duration – 0.18	(h) high mean duration – 0.59
(i) low standard deviation of duration – 0.38	(j) high standard deviation of duration – 0.46

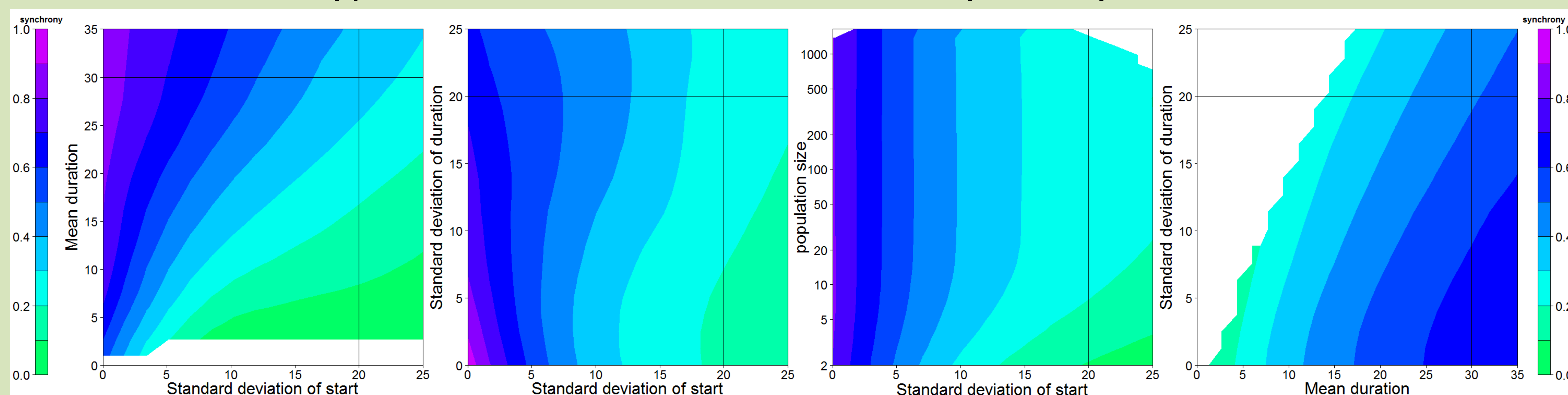
Some measures of synchrony perform better than others



Individual variation influences synchrony



Different types of variation interact to influence synchrony



Discussion

- The Augspurger and Overlap methods of measuring synchrony were developed for flowering synchrony; the Kempenaers method was first developed for birds.
- The Augspurger and Kempenaers methods are equivalent which shows similarity of synchrony among kingdoms.
- The Augspurger method calculates synchrony relative to the duration of individual activity, whereas the Overlap method calculates synchrony relative to the total duration of a pair's activity. The Simple methods rely solely on population-level data.
- Population size had no direct effect on synchrony which allows for comparisons between different population sizes.

Conclusions

- Standard deviation of start date by itself and its interaction with mean duration have the largest influence on synchrony.
- We recommend using Augspurger's (1983) measure of synchrony because it mathematically and biologically represents synchrony and it has already been widely used.

Acknowledgments

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References

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