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# Interactions of temperature and diet affect *Drosophila suzukii*

**The spotted wing drosophila *Drosophila suzukii* Matsumura (Diptera: *Drosophilidae*) is an invasive pest of various crop and wild host fruit [1]. Pest pressure and the resulting damage are difficult to estimate, because population dynamics of *D. suzukii* highly depend on temperature and available host range [2, 3]. In a laboratory experiment, we tested how temperature and diet interact and consequently affect population parameters of *D. suzukii*.**

## Methods

8 ± 2 days old flies were acclimated for 48 h to 15, 23 and 30 °C, before they were allowed to oviposit (2 × 24 h) under the same temperatures either on artificial banana medium, grape juice medium or plums (Dabrovice). Six replicates, each with ten males and ten females, were tested per treatment. Since eggs are not visible on the banana medium, oviposition and larval survival were only assessed in the grape juice medium and in plums.

**Table:** Recipe of the artificial diets

| Ingredients | Banana | Grape | Plum |
|---|---|---|---|
| Fruit | 26.5 % | 79 % | 100 % |
| Brewer's yeast | 3.3 % | 1.5 % | |
| Sugar | 1.3 % | 8.4 % | |
| Flour | 2 % | 1.3 % | |
| Water | 63 % | | |
| Agar-Agar | 1.3 % | 1.3 % | |
| Nipagin | 0.23 % | 0.3 % | |

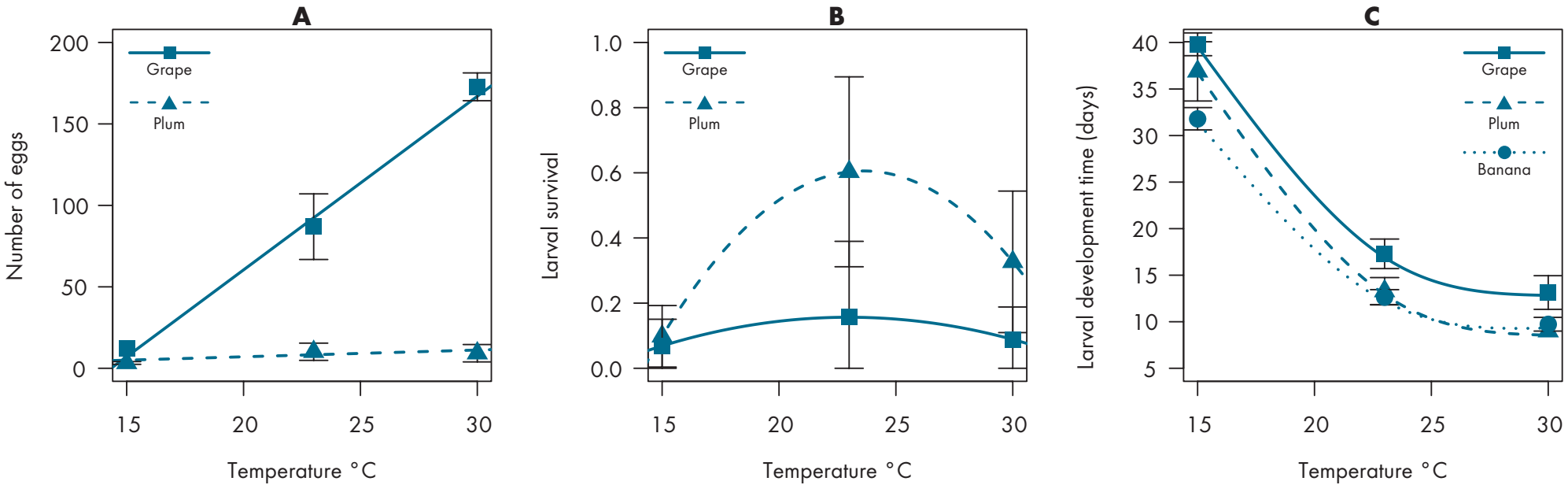


**Figure:** Mean ± SD of (A) the number of eggs laid, (B) larval survival and (C) development time.

## Results

The statistical analysis (generalized linear mixed effect models) revealed significant interactions: oviposition ($z_{1,39} = 2.6$, $P = 0.009$, Fig. A) and larval survival ($z_{1,86} = 2.4$, $P = 0.017$, Fig. B) under different temperatures clearly depended on the diet. Oviposition increased with higher temperatures in the soft grape juice diet, but was limited in plums by the required fruit skin penetration. Compared to the banana medium, the grape juice medium with less yeast had a low nutritional value, limitting larval development under all temperatures (Fig. B, C). Under 15 °C, larval development time in plums was as long as in the low quality grape juice diet, but was as fast as in the banana diet under higher temperatures (Fig. C; diet-specific smoothing curves in the generalized additive model had a better fit than one curve for all diets).

## Conclusions

Interactions between diet and temperature affect oviposition and larval development. Therefore, both factors need to be considered simultaneously to adequately estimate population parameters. Results from laboratory experiments cannot be easily extrapolated to other situations.

**References**
[1] Asplen MK, et al. 2015, J Pest Sci 88 (3):469-494 ; [2] Diepenbrock LM, Swoboda-Bhattarai KA, Burrack HJ 2016, J Pest Sci 89:761–769;
[3] Tochen S, et al. 2014, Environ Entomol 43 (2):501-510.