

Humidity and host-plant as important factors influencing the pre-imaginal development of fruit flies (Diptera: Tephritidae)

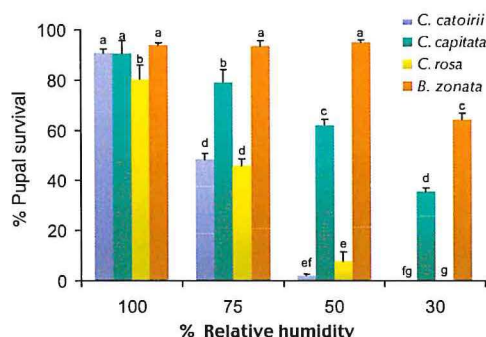
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Fruit flies (Diptera: Tephritidae) are serious pests on fruit and vegetable crops in most tropical countries. In Reunion Island, four species of Tephritidae cause damages on fruit crops namely the Mascarenes fruit fly, *Ceratitis catoirii* (Guérin Ménéville), the Mediterranean fruit fly, *C. capitata* (Wiedemann), the Natal fruit fly, *C. rosa* Karsch, and the recently invasive peach fruit fly, *Bactrocera zonata* (Saunders). If temperature has a strong influence on the survivorship during the pre-imaginal development of these four species (Duyck and Quilici 2002; Duyck *et al.* 2004), the influence of humidity and host fruit has received little attention up to now.

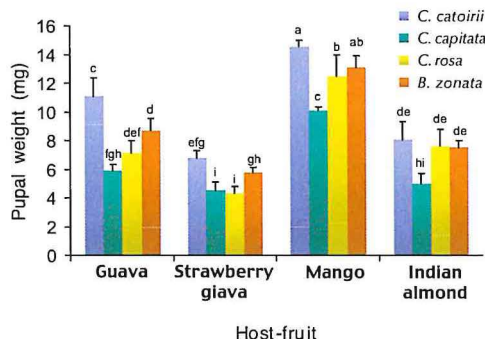
Influence of humidity

A range of relative humidity (100, 75, 50 and 30% RH) has been obtained by placing a solution of water alone or a solution of water saturated with NaCl, Mg (NO₃)₂·6H₂O or MgCl₂·6H₂O in an hermetic box, respectively (Winston and Bates 1960).



2-way ANOVA and Student Newman-Keuls multiple range test on Arcsin (Sqrt(X)), P<0.05

Influence of host fruit

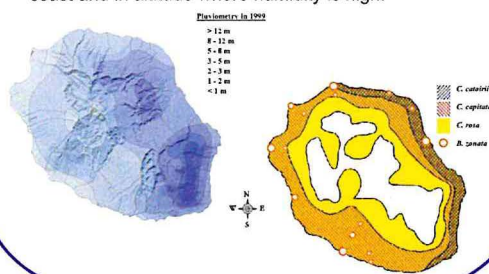


Parameter	Fruit fly species	Fruit species			
		Guava	Strawberry guava	Mango	Indian almond
% Survival to pupation	<i>B. zonata</i>	73 ^{bcd}	74 ^{bcd}	73 ^{bcd}	95 ^a
	<i>C. capitata</i>	58 ^{cd}	50 ^d	64 ^{cd}	79 ^{bc}
	<i>C. rosa</i>	90 ^{ab}	49 ^d	64 ^{cd}	82 ^{bc}
	<i>C. catoirii</i>	73 ^{bcd}	22 ^e	67 ^{cd}	74 ^{bcd}
Larval development time (days)	<i>B. zonata</i>	9 ^{fg}	14 ^c	7 ^g	10 ^{ef}
	<i>C. capitata</i>	12 ^{cde}	16 ^b	9 ^{fg}	13 ^{cd}
	<i>C. rosa</i>	12 ^{cd}	16 ^b	12 ^{cd}	12 ^{cd}
	<i>C. catoirii</i>	13 ^{cd}	18 ^a	9 ^{fg}	13 ^{cd}

2-way ANOVA and Student Newman-Keuls multiple range test on untransformed data for developmental times, on Arcsin (Sqrt(X)) for survival and on Sqrt(X) for pupal weight, P<0.05

According to the different parameters, mango appears to be a good larval host for the four fruit flies species. *Bactrocera zonata* developed very well in the four fruit species notably on strawberry guava although this fruit, which is widespread in the island, is not a common host for this species. Preferences of females should be studied to confirm the potential importance of this wild host in the multiplication of *B. zonata*.

- Ceratitis capitata* and particularly *Bactrocera zonata* showed a high tolerance to dryness contrary to *C. catoirii* and *C. rosa*.
- Our results are in accordance with the observed distribution of *Ceratitis catoirii* which is mostly present on the wet windward coast of Reunion island. *Ceratitis rosa* is present in most areas of Reunion island up to an altitude of 1500 m but is more prevalent on the east coast and in altitude where humidity is high.



Conclusions

- Host-fruit species influences survivorship and developmental time of larvae and also strongly influences pupal weight. The relationship between host-fruit species, pupal weight and fecundity of the emerging females will require further studies.
 - Humidity strongly influences the distribution of fruit flies in Reunion island. Similarly the potential distribution in the Mediterranean area of *Bactrocera zonata* which is currently invasive in Egypt will probably be affected by this factor.
- ➔ These two factors could be used in addition to temperature thresholds as important tools for pest risk analysis (PRA).

References

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