

1 Article

2 **Mediterranean fruit fly *Ceratitis capitata* (Diptera:**
3 **Tephritidae) eggs and larvae responses to a low-**
4 **oxygen/high-nitrogen atmosphere**

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11 **Abstract:** The Mediterranean fruit fly, *Ceratitis capitata* (Wiedemann) (Diptera: Tephritidae), is one
12 of the most damaging horticultural insect pests. This study used a low-oxygen/high-nitrogen
13 bioassay to control *C. capitata*. Two low-oxygen treatments were applied (0.5% O₂ + 99.5 N₂ and 5%
14 O₂ + 95% N₂) to *C. capitata* eggs, 1st, 2nd and 3rd instar larvae from 0 to nine days on a carrot diet at
15 25°C; 70–75% RH. The pupariation, adult emergence, and sex ratios of survived flies were examined.
16 The results demonstrated increased mortality of all tested life stages correlated with increased
17 exposure times at both levels of low-oxygen treatments. Complete control of eggs was achieved
18 after eight days and nine days for larvae using 0.5% O₂ at 25°C; 70–75% RH. The 3rd instar was the
19 most tolerant stage, while the egg was the most susceptible stage to the low-oxygen environment.
20 There were no significant differences in sex ratios between emerged adults after low-oxygen and
21 control treatments. This study demonstrates and confirms the mortalities of *C. capitata* caused by
22 low-oxygen treatment, which may help develop new postharvest strategies to control this
23 destructive fruit fly pest.

24 **Keywords:** Postharvest treatment; low oxygen; high nitrogen; tephritid fruit fly

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