Sensitivity of *Bactrocera invadens* (Diptera: Tephritidae) to methyl eugenol

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Bactrocera invadens Drew, Tsuruta & White, 2005 (Diptera: Tephritidae) is an invasive fruit fly pest of Asian origin that was detected for the first time on the African continent in 2003 (Drew *et al.* 2005; Lux *et al.* 2003). The pest has spread rapidly since and is now established in several sub-Saharan countries (De Meyer *et al.* 2012). *B. invadens* responds to the male lure methyl eugenol (ME), (Lux *et al.* 2003) which is used for monitoring and control of the pest. Attraction of *B. invadens* to ME has to date not been quantified, although such information has been previously documented for *Bactrocera dorsalis* (Hendel), a close relative of *B. invadens* (Metcalf *et al.* 1975; Shelly *et al.* 2010). The objectives of the study were therefore to quantify the sensitivity of *B. invadens* to ME using mark–release–recapture techniques.

The *B. invadens* used in these experiments originated from colonies maintained at the International Centre of Insect Physiology and Ecology (ICIPE), Nairobi, Kenya (Ekesi *et al.* 2007). Newly formed pupae were shipped by road to the Sokoine University of Agriculture (SUA), Morogoro, Tanzania. Upon arrival at SUA, pupae were marked with fluorescent dyes. Four fluorescent pigments were used: Stellar Green 8, Magenta 10 and Lunar Yellow 27 from Swada, Cheshire, United Kingdom (FTX series) and White from Bastion Paint, KwaZulu-Natal, South Africa. The amount of dye used was between 0.01 g and 0.02 g per 100 pupae. Pupae of each colour were placed separately in a 9-l aerated plastic container. In each container, water and a mixture of sugar and yeast hydrolysate were added. Prior to release, flies were held at 28 °C and 75 % RH. *B. invadens* males were released at approximately four days after adult emergence. Young immature adult males were used in order to simulate the arrival phase of a fruit fly invasion. Fruit flies are introduced in an area either through anthropogenic movement of infested fruit from which adult flies would emerge or by extensive dispersive movement of post-teneral adults, a movement characteristic of dacine fruit flies (Fletcher 1987). Often, therefore, fruit fly incursions would contain a high number of young males.

Studies were carried out at two sites at Mikese, Morogoro District, Tanzania, between 23 August and 16 November 2012. A distance of approximately 3.3 km separated the two sites. One site contained mango trees (*Mangifera indica* L.) (Mwatawala *et al.* (2006) (Block 050: 06°46′36.4″S 37°54′47.2″E), and the other site contained mango and citrus trees (Block 051: 06°48′23.6″S 37°54′47.2″E). During the study period, mean daily maximum and mean daily minimum temperatures were 31.83 ± 0.21 °C and 18.85 ± 0.20 °C, respectively (Tanzania Meteorological Agency, Morogoro). The mean relative humidity was 65.83 ± 0.51 % and total rainfall recorded during the study period was 25.8 mm (Tanzania Meteorological Agency, Morogoro).

We used yellow Lynfield traps (River Bioscience, Port Elizabeth, South Africa) baited with Invader-Lure (River Bioscience), a fibre board block impregnated with 15 g of ME. A 3 g tablet with 19.5 % dichlorvos (River Bioscience) was placed at the bottom of the trap. The ME dispenser and insecticide in each trap were replaced with fresh ones before each test.

We determined the response of *B. invadens* when released at different distances from an ME trap. At each site, a trap was placed in the centre and was suspended on a mango (in Block 050) or citrus (in Block 051) tree at approximately 1.5 m above the ground. *B. invadens* males were released at four distances from the central trap: 25 m, 50 m, 100 m and 250 m. Flies released at each distance were marked with a different dye colour. Males were released at three densities: 48, 128 and 160, separately per site and in separate weeks in order to determine the effect of invading propagule pressure on probability of detection. Equal numbers of males were released at each of 16 release points (four distances along four cardinal directions) per site. There were six replicates for the lowest release density and four replicates for each of the higher release densities. The trap at each site was checked and emptied after seven days.

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